



**CHARLES F. CAVENDISH.**



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# MODEL RAILWAYS

## AND LOCOMOTIVES

Edited by HENRY GREENLY

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# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 1. JANUARY, 1910.

## BETWEEN OURSELVES.

WE thank our readers for the numerous letters we have received expressing their appreciation of our Magazine, and trust that they will be equally pleased with Volume the Second. We also have received many letters of congratulation from purchasers of our Sixpenny Handbook. In respect to this a reader in Southern Germany writes:—"Your last publication, *The Model Railways Handbook*, is very interesting indeed, and I must say that there is no work similar to it in the world which be compared to it. It represents the accomplishment of a cleverful and hardwork labour which only practical men of long experience and of seldom endurance could perform." Although perhaps quaint English, it is sufficiently expressive of his appreciation and flattering to ourselves. Other subscribers to the Magazine write:—"No comments to make: your Magazine is perfect." "Just what was wanted; no other journal filled the gap." "Congratulate on excellence of your paper; wish you all success." "An admirable Magazine which fulfils its purpose exactly."

We regret we did not announce in our Xmas issue that an index to Volume I. would be given with this issue. Binding cases which will include this index are also obtainable *direct from our printers*, Messrs. Lea & Co., Ltd., Gold Street, Northampton, for the sum of 1/2 post free. They will also undertake the binding on receipt of the copies, post paid, and a P.O. for 2/3.

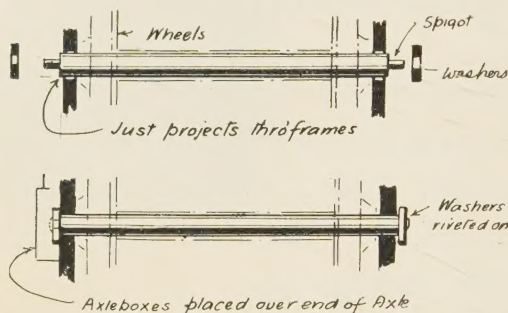
With reference to the article on the Great Western Railway singles, our contributor does not attempt to cover the whole history of these engines, and therefore we may have something to say about them in our next issue. As most know, the first batch of these engines were constructed to run on the "Broad gauge," and afterwards converted.

The Wagon Competition announced in our December issue has brought a large number of replies, and although at the time of writing we have no idea which the first six will be, we feel sure the Gunpowder Van will obtain a "place."

Owing to our instructions on the building up of the model Midland locomotive in the October issue having been written before the works had



finished the parts, the modification in the design of the tender axles for the tender renders the instructions slightly inaccurate in this particular. The ends of the tender axles are now provided with spigots. The wheels and tubular distance piece being slipped on the axles between the frames, the washers are then placed on the spigoted ends and the latter lightly riveted over. This retains the axles and wheels in the frames, and the dummy axleboxes and springs may then be riveted in place.

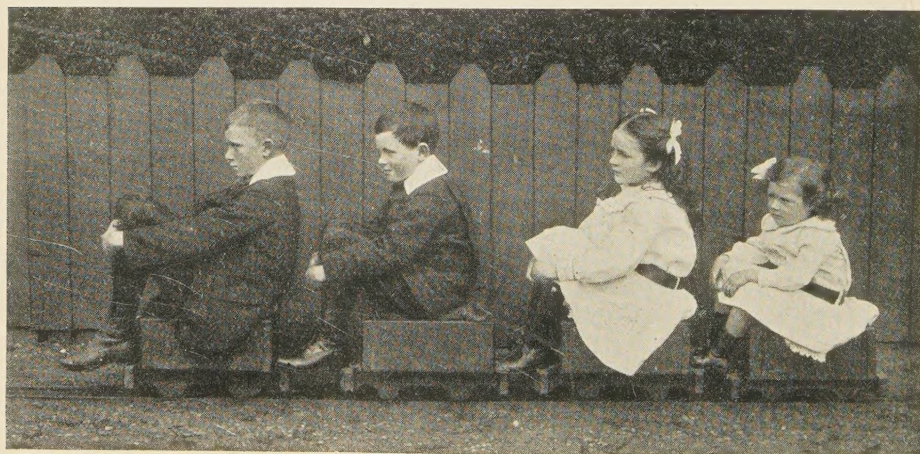


FIXING THE TENDER AXLES  
FOR THE MODEL  
MIDLAND LOCOMOTIVE.

(See issue of October, 1909.)



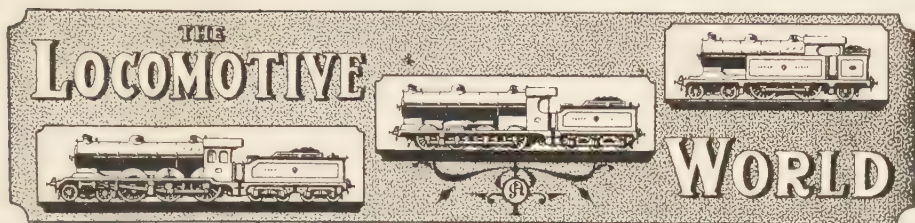
The photograph below has been sent us by our friend Mr. W. M. Spriggs, of Acock's Green, Birmingham. Some three years ago he had built for him a heavy  $3\frac{1}{2}$ " gauge 2-4-2 type tank engine for hauling his children. The "increase in the traffic" has necessitated a larger engine, and a  $7\frac{1}{4}$ " gauge locomotive embodying novel features is being designed and built for him. This is the model referred to below. The smaller engine has been rebuilt, and is now for sale.



WAITING FOR THE LOCO.

When *is* the new Engine coming, Daddy?

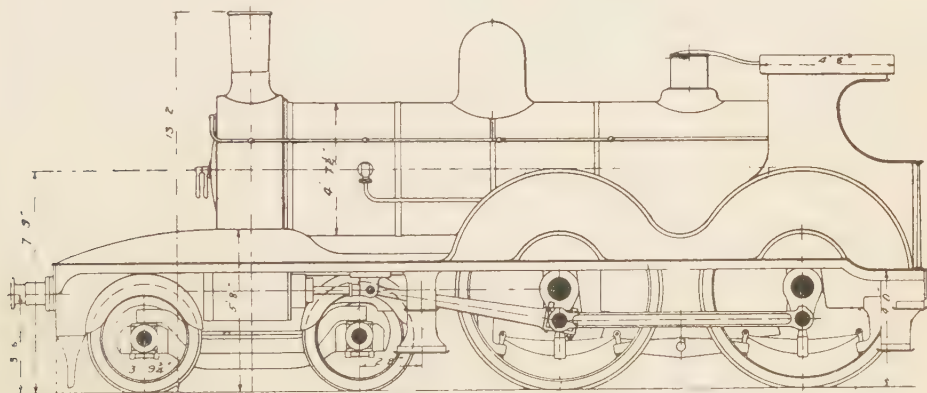




## THE EXPRESS LOCOMOTIVES OF THE LONDON AND SOUTH-WESTERN RAILWAY.

BY CECIL J. ALLEN.

IN turning now to a brief consideration of the express locomotives of a railway far removed in distance from that which we considered last month, we find a line very similarly hampered in the working of its express train services—as regards those, at least, which are of a competitive character—by the same difficulty of grading. Taking the main Plymouth line, this is not especially apparent until after Salisbury has been passed, although the long and gradual rise from Byfleet to Grateley necessitates a certain amount of collar-work, particularly with heavy trains. Beyond Salisbury, however,



THE L.S.W.R. EXPRESS LOCOMOTIVE OF A DECADE AGO : MR. W. ADAMS' OUTSIDE-CYLINDER 4-4-0 TYPE ENGINE, No. 580 CLASS.

the line becomes far steeper and more switchback, long grades as stiff as 1 in 80 occurring in places, whilst between Exeter and Plymouth it is literally mountainous, the summit at Meldon, near Okehampton, where the spurs of Dartmoor are crossed, being no less than 800 feet above sea-level. Not only do the long grades on either side of the summit constitute in their ascent a most formidable obstacle to the booking of a high average speed over this section of the line, but their winding character is such as to compel a cautious descent also. The grading of the Basingstoke, Southampton, Bournemouth and Weymouth division of the main line is not so severe, although not altogether easy, but its non-competitive character does not call for the "cut" schedules that obtain on the Exeter and Plymouth service. The trains for Portsmouth have the difficult grades to Haslemere summit to negotiate, of

a similar character to that with which cyclists on the Portsmouth road are familiar at Hindhead, but on this section again, although competitive, the speeds are little more than moderate.

The competition with the Great Western Railway to the West of England has always been of a very keen nature, and, during the summer of 1904, the London and South-Western Railway Company gave abundant proof of its enterprise by beating the time of its rival to Exeter by 10 minutes. Now, however, the opening of the new Westbury route has given the G.W.R. the "whip hand" to the West, since, although 2 miles longer to Exeter than the South-Western route, it could not be described as altogether so severe in grading, while the fact that the L. and S.W.R. management does not see its way to losing the important cross-country connections at Salisbury by omitting the stop at that town, contributes still further to the longer time occupied on the journey. Still, the bookings of the fastest trains are noteworthy, the 83 $\frac{3}{4}$  miles from Waterloo to Salisbury occupying 91 minutes only—an average speed of 55.1 miles per hour—while the 88 miles thence to Exeter are now booked to be covered in 96 minutes—an average of 55 miles an hour, and one truly remarkable in view of the extreme severity of the grading. In fact, I should be almost prepared to say that the latter run is, at the present time, one of the most meritorious schedules in operation in the United Kingdom. The fastest actual booked run on the London and South-Western system is one by an up corridor express from the West of England, which runs from Andover Junction to Vauxhall, 65 miles, in 68 minutes. This represents an average speed of 57.4 miles per hour, but for 45 miles the line has in grading a falling tendency. The longest non-stop runs are performed on the Bournemouth service, one down train and two up covering this 108 miles without intermediate stoppage, the former in 126 minutes, at an average of 51.4 miles per hour. Another down train runs to Christchurch, 104 $\frac{1}{2}$  miles, without stopping.

The London and South-Western Railway was one of the earliest lines in this country to adopt the 4-4-0 type of locomotive as a standard for main line service, and I believe I am also right—I am open to conviction in this matter—in saying that the pioneers in this country, of the corresponding type of tank engine—the 4-4-2 type—also appeared on the L. and S.W.R. I have no reliable information to say definitely whether the South-Western or the London, Tilbury and Southend Railway took the lead in this respect, although the engines of this type on the latter line first appeared in 1877. Curiously enough, although this does not really form part of our subject, while many of the great trunk lines have adopted the 4-4-2 type of tank locomotive as a standard, the L. and S.W.R. on the other hand, has now abandoned the design. Another feature in design for which the London and South-Western locomotive management had a particular fondness was that of outside cylinders; this was no doubt common enough in the past, and is still in the case of those engines whose wheel or cylinder arrangements require it, but the late Mr. William Adams, who preceded Mr. Dugald Drummond, the present locomotive superintendent, in that office, fitted outside cylinders even to his 4-4-0 express locomotives until his retirement in comparatively recent years. Every locomotive enthusiast will be familiar with the graceful lines of his outside-cylinder four-coupled bogie express engines, which, although fitted with the new standard chimney and boiler fittings instituted by Mr. Drummond, are still doing honourable service on the line.

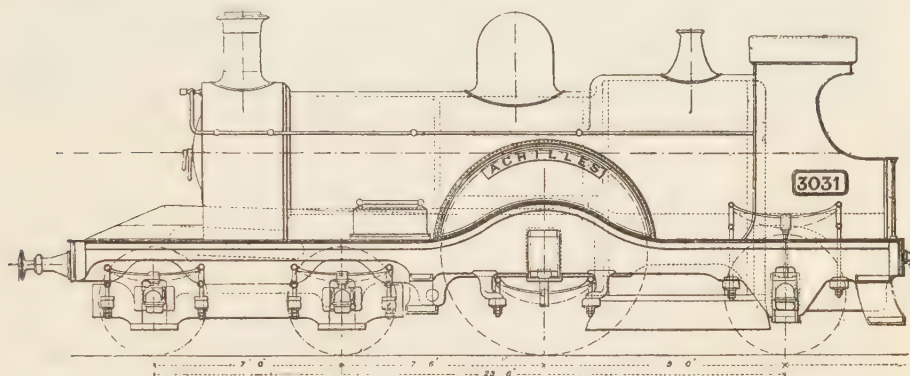
*(To be continued.)*

## THE PASSING OF THE GREAT WESTERN RAILWAY SINGLE BOGIE EXPRESS ENGINES.

BY "SINGLEWHEELER."

It is with the deepest regret that I see, nearly every month, in one or other of the railway periodicals, that the Great Western Railway's 7' 8" bogie "singles" are gradually being withdrawn from service. I, therefore, beg to be allowed to say a few words in favour of these magnificent machines.

Designed and built at Swindon in the years 1892-98, these engines, of which there were eighty, found themselves called upon to take the place of the famous broad gauge "eight-footers,"—a very difficult task ! However, they proved themselves capable of what was expected of them and they have, at different times, done work which, in these days of rapid travel, would hardly be credited to a "single." They could, with moderately heavy trains, do what any four-coupled or six-coupled express engine of to-day



THE THIRD PHASE IN THE LIFE OF THE G.W.R. 7' 8" SINGLES.

can do, as regards speed. In fact, the writer once went from London to Reading (36 miles) non-stop behind No. 3071 "Emlyn" in 34 minutes, with eight eight-wheelers, in spite of a very bad signal slack at Ealing Broadway and another at Slough. "Emlyn" also made a very bad start from Paddington, taking nearly *four* minutes to pass Westbourne Park station! The maximum speed was reached soon after the Slough check, when "Emlyn" covered 5 miles in 3 min. 57 sec., which is considerably over 75 miles per hour.

Another good run was behind No. 3031 "Achilles," this time in the reverse direction, *i.e.*, from Reading to London. We left Reading at 3-37 p.m. exactly, and came to a stand in Paddington Station at just over nine minutes past four, the exact time occupied on the journey of 36 miles being 32 min. 41 secs. The load on this occasion was six eight-wheelers, one six-wheeler and two empty six-wheeled milk-vans. These two runs were made under very favourable weather conditions.

Another fine instance of the speed capabilities of the "singles" was the famous run with the mails on May the 9th, 1904, when No. 3065 "Duke of Connaught" ran from Bristol to Paddington (118½ miles) in 99¾ minutes. The load, however, was very light, being only two mail vans, a total weight of about 60 tons.

The G.W.R. "singles" were, without any possible doubt, the most handsome engines this country has ever produced, with their bright brass domes and safety-valve covers, their beautiful green paint for the boiler, etc.,



and dark red-brown for the frames, wheels and splashers. Even the new style of painting (*i.e.*, green, as before, but black for the frames) fails to lessen their handsomeness, providing the domes are not painted green, as is so on a few of the engines.



*Photo by]*

THE LAST PHASE.

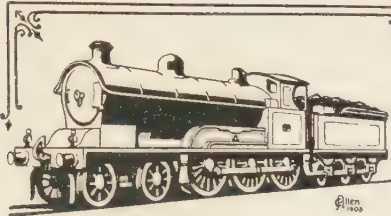
*[W. G. Roblin, Esq.*

About twenty of these engines have been scrapped, and fifteen have been rebuilt with the standard G.W.R. domeless boiler. This means that about twenty-five out of the original eighty are running in their original condition; and most of these are painted in the new standard G.W.R. colours, and, as was stated above, some have their domes painted green. Let us hope that the few which are running will yet be given an opportunity of once more showing their capabilities, and that when the Great Western



A 2" GAUGE MODEL OF THE G.W.R. "WORCESTER."

Railway Company find it necessary to remove them all, *one* will be preserved in its original condition as a monument to Mr. Dean and his magnificent engines. By the time that all the "singles" have been withdrawn the long-looked-for Railway Museum may possibly have been founded, and would be a very appropriate place in which to put *one* of a class of locomotive which has probably proved one of the most useful in the United Kingdom.



# MODEL LOCOMOTIVE CONSTRUCTION

## DESIGN FOR 3 $\frac{1}{4}$ " GAUGE MODEL L.N.W.R. "PRECURSOR."

(Continued from page 384, Vol. I. See Supplement, December, 1909, issue.)

THE L.N.W.R. "Precursor" class locomotive is undoubtedly one of the most popular 4-4-0 type engines in the country, and as a prototype for a model gives satisfaction from most points of view. The only drawback is that the

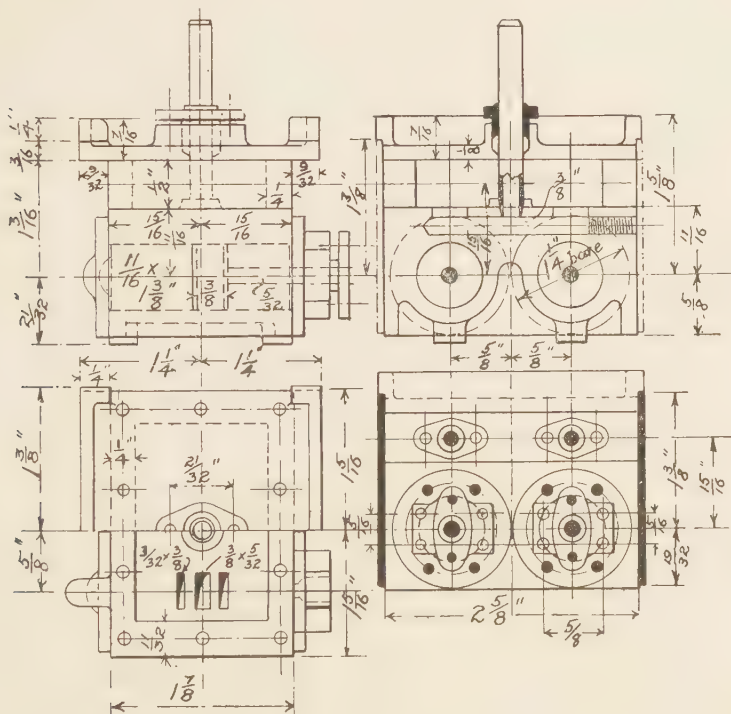


FIG. 3.—CYLINDERS FOR MODEL L.N.W.R. "PRECURSOR."

wheelbase is rather long, and, if scale size bogie wheels are employed, the model will not negotiate a very sharp curve. In the original engine, to provide sufficient lateral play for the bogie, the side frames are made in two pieces, lapped together just behind the cylinders. The model illustrated in the supplement and photograph is built in this way, the leading frame-plates being placed inside the trailing portions, and thus allowing an extra amount of play equal to the thickness of the material on each side. The

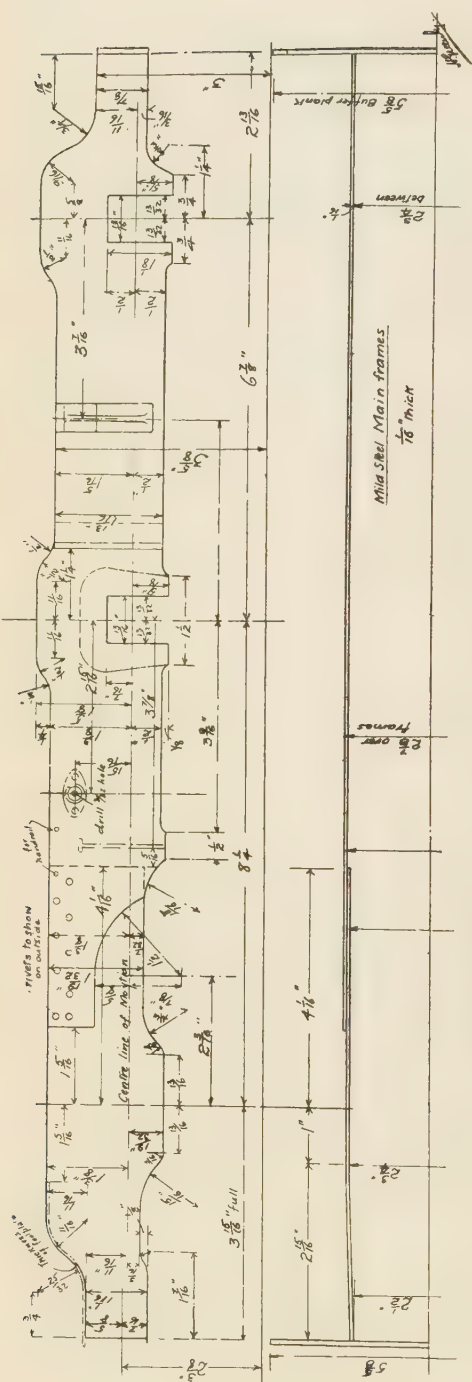


FIG. 4.—FRAMES FOR MODEL 3 1/4" GAUGE L.N.W.R. LOCOMOTIVE "PRECURSOR."

driving and coupled axleboxes are in the better models fitted with hornplates, as shown on the drawing. These are gunmetal castings, and are riveted on to the main frames with copper rivets. The axleboxes are prevented from falling out by the usual hornstay, made in this case of  $\frac{1}{4}'' \times \frac{5}{16}''$  metal fitted on with two screws driven from below.

At the trailing end the frames are tied together by a stiff casting, which forms the raised footplate for the driver, with the "chequered" portion duly cast on, and a support for the steam brake cylinder.

The frames at the leading end are set in to  $2\frac{1}{2}''$  apart ( $2\frac{3}{8}''$  outside), and are fixed to the buffer-plank by pieces of stiff angle brass on the inside (or better still, angle castings with a flange on the top to which the footplating may be secured) and special webbed angles on the outside. These angles are shown clearly on the general arrangement drawing. The guard-irons are fitted to the outside of the frames below these angles. The frames are stiffened in the centre by the motion plate and by a stretcher just in front of the firebox.

The cylinders are of the standard model type as first suggested by Mr. H. Greenly some eight years ago, but are arranged with the cylinder and valve-spindle centres as nearly as possible to scale, so that the full "Joy's" valve gear with lap and lead, may be fitted. The top cover of the steam chest is of novel design, in that it provides a tightly-fitting bottom for the smokebox, and also is flanged to allow for fixing the latter to the cover. The cylinders are of  $\frac{11}{16}''$  bore  $\times$   $1\frac{3}{8}''$  stroke (following the well-known rule of Scale size = bore and scale size of 24" for stroke) and in practice worked admirably. A detail drawing is shown in Fig. 3 herewith.

(To be continued.)



**PERMANENT MAGNET MOTOR MECHANISMS FOR No. 1 GAUGE.***(See also September, 1909, issue).*

WE now include an outline drawing of the new motor mechanisms as made in the  $1\frac{3}{4}$ " gauge. The general arrangement is the same as the No. 0 gauge mechanism, and the motor drives direct on to a crown wheel fixed on the

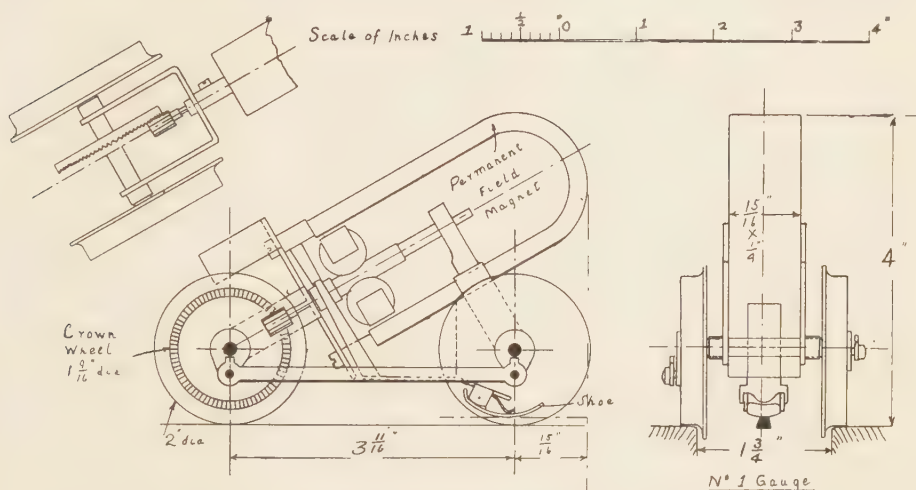
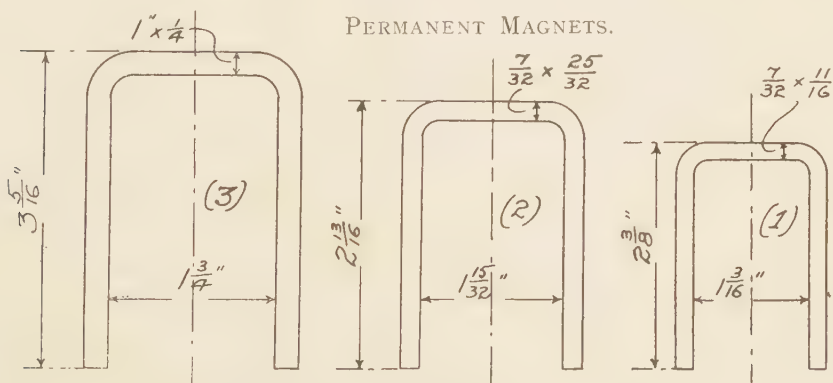


DIAGRAM OF NO. 1 GAUGE PERMANENT MAGNET MOTOR MECHANISM.

driving axle. The ratio of gearing is eleven to one. The mechanism is fitted with a collecting shoe which can be bent up or down slightly to suit the tin-plate rails or "third rails" which are made to the new standard dimension of  $\frac{1}{8}$ " above the running rails. The fixing bracket is a part of the end bearing plate and extends forwards at a decline parallel to the motor spindle, as shown in the plan view. Full-size blue prints are now ready, 6d. each, post free.



The above drawings show to half-full size permanent magnets which are now obtainable from Messrs. Bassett-Lowke & Co., and which will be found useful in making automatic reversers and small motors and dynamos. The prices, we understand, are (1) 2/6, (2) 3/6, and (3) 5/6 respectively.

## INSTRUCTIONS FOR LAYING SMALL SCALE POINTS IN MODEL PERMANENT WAY.

BY JAS. MACKENZIE

THESE sets are sent out with the parts of the frog fixed together, slide chairs fixed, and the check rails also fixed to the stock rails, and if these instructions are followed carefully they will make a set of points over which any vehicle with decent wheels which are the right distance back to back, can be run at any speed at which it is possible to run a model. This matter of the distance back to back of wheels is really of the greatest importance, and no pains should be spared to get it exactly right. If it is not correct, no amount of labour bestowed on the points, or no increase of flange, will make matters right, as will be shewn later. When you have decided where the points are to be laid, mark carefully where the tip of the switch comes (as at Fig. 1).

Having done this, begin to lay the sleepers on the battens, boards, or whatever foundation you decide to use. Be careful to space them aright— $1\frac{1}{2}$ " centre to centre—and fix down as described in the instructions on track laying. See that on the main line side (A, Fig. 1) the sleepers are quite straight on the ends: on the other, or the branch side, they will gradually

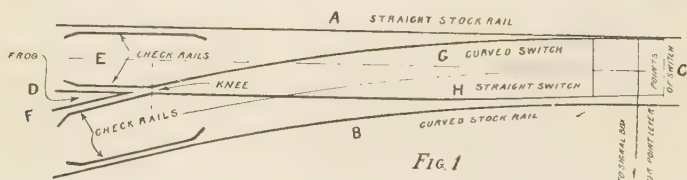


FIG. 1.—NAMES OF PARTS OF STANDARD POINTS.

increase in length after the first four or five. Key all the chairs on the rails as described in the instructions in our Handbook before beginning to lay any of it down. Now take the straight stock rail (the right one can be easily distinguished by noticing the side the slide chairs are on), and lay down parallel to the edge of the sleepers at the side A, and with the end slide chair on the point previously marked as the tip of the switch. Fix down with six or seven spikes, driven half-way in, and see that the rail is quite straight the distance from the ends of the sleepers to be such as will bring the whole line at C, Fig. 1, in the middle of the sleepers.

Now take the part consisting of the switch rails and frog, and lay on the sleepers with the tip of the switch rail on the end slide chair at C, Fig. 1, and the part D quite parallel to the stock rail already laid, and correct as to gauge. To make sure that it is quite parallel, lay a straight edge along D, and see that its edge lies quite parallel to the stock rail for the whole length. Be careful, meanwhile, that the tip of the switch lies on the first slide chair: it may project over the side of the chair about one-eighth of an inch, but not more. When you are sure that the gauge at E, Fig. 1, is correct, carefully drive in a few spikes in the chairs along D and F, and in one or two of the chairs past the knee towards the tip. Try the measurements over again, and

L POINT TO POINT

M

CENTRE OF CROSSOVER

THIS TIE ROD NOT REQUIRED FOR 1 1/4 GAUGES

CONNECT TO NEXT SECTION

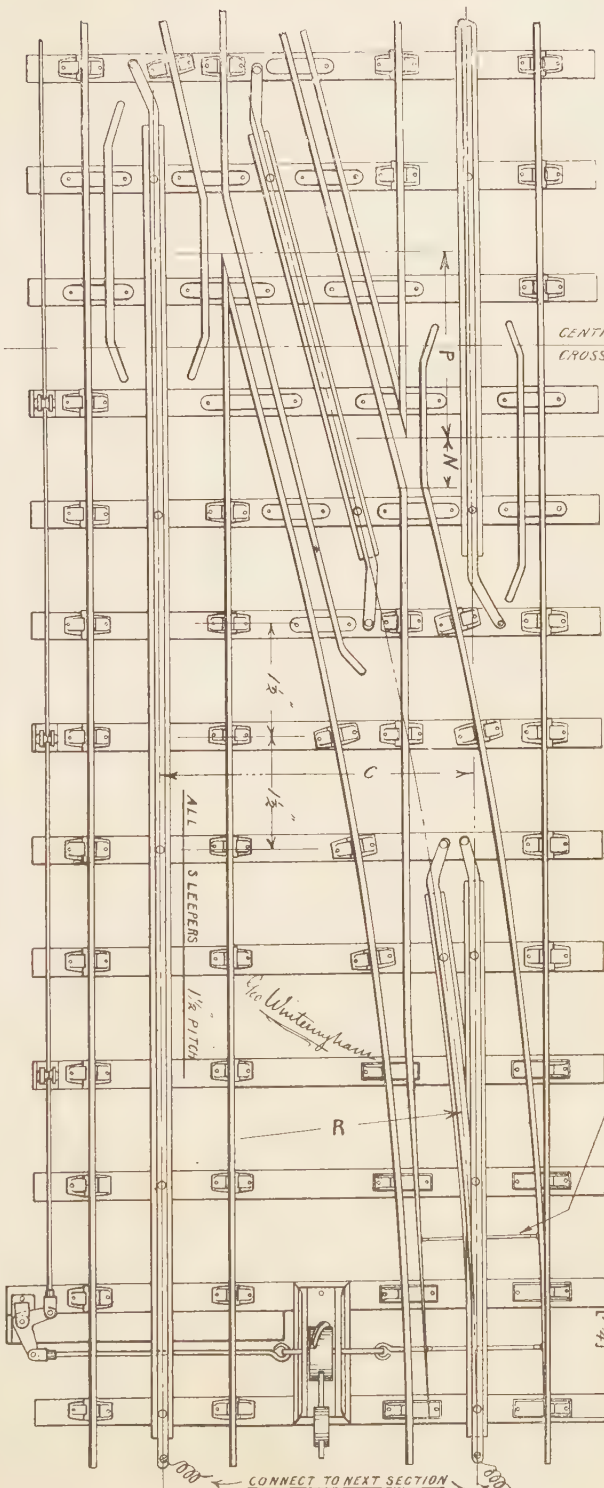


DIAGRAM OF CROSSOVERS

SCHEDULE

| GAUGE | ANGLE  | S.L.P. | CHAINS | SLIDE | P.T. ROD | L       | M       | N     | P     | R   | C     | GAUGE | ANGLE  | S.L.P. | CHAINS | SLIDE | P.T. ROD | L       | M       | N     | P     | R    | C     |
|-------|--------|--------|--------|-------|----------|---------|---------|-------|-------|-----|-------|-------|--------|--------|--------|-------|----------|---------|---------|-------|-------|------|-------|
| 1 1/4 | 1 in 4 | 15     | 42     | 12    | 4        | 1-9 1/4 | 10      | 1 1/8 | 1 1/4 | 3-4 | 2 3/8 | 2     | 1 in 6 | 34     | 122    | 20    | 9        | 4-1 1/4 | 1-1 1/8 | 3 1/4 | 5     | 12-0 | 4 7/8 |
| 1 3/4 | 1 in 4 | 20     | 64     | 12    | 5        | 2-4 3/4 | 1-1 1/8 | 1 1/8 | 2 1/2 | 4-6 | 4 7/8 | 2 1/2 | 1 in 4 | 28     | 104    | 16    | 7        | 3-6 3/4 | 1-7 1/8 | 1 1/8 | 2     | 6-0  | 5 1/8 |
| 2     | 1 in 4 | 25     | 86     | 16    | 7        | 3-0 1/4 | 1-4 1/8 | 1 1/8 | 3 3/8 | 5-6 | 4 1/8 | 2 1/2 | 1 in 6 | 39     | 154    | 20    | 11       | 4-9 1/4 | 2-3 1/8 | 3 1/4 | 3 1/2 | 13-6 | 5 1/8 |



if all is correct, spike down the straight switch, being very careful meanwhile that the gauge is correct between it and the stock rail A. Now finish spiking down A for its entire length, do the same with the frog as far as the knee, and also the curved rail G. This had better be fixed down to a radius board or sweep as described in the track laying instructions. Be sure that the rail H comes in line with D, and that G is in line with F. See that G is the correct radius when it is pressed over against A at the tip.

Having accomplished this, the curved stock rail B can now be easily laid by the aid of the "Simplex" gauge, with the double leg on G so as to give a slight widening of the gauge on the curve. The gauge between H and A should be correct when H is over against B, and the gauge at the extreme end of the stock rails at C should be correct to join up to the next section of track. Be sure that when the points are connected up to the lever or signalbox they are thrown hard over against the stock rails in each position. The tip of the switches should be very sharp, and slightly rounded off on the inside, that is, on the sides towards the centre of the track.

Be sure that the check rails at A and B are fixed close enough to the stock rail to keep the flange of the wheel from striking the nose of the frog. This brings us back to the remarks made at the beginning of this article as to the distance between the wheels back to back, and the importance of this dimension will now be seen. If the distance between flanges is too great, it will at

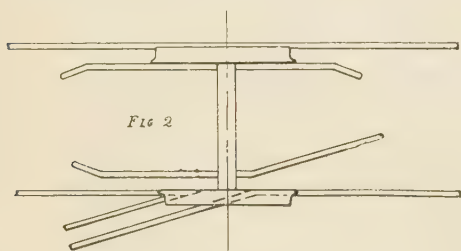
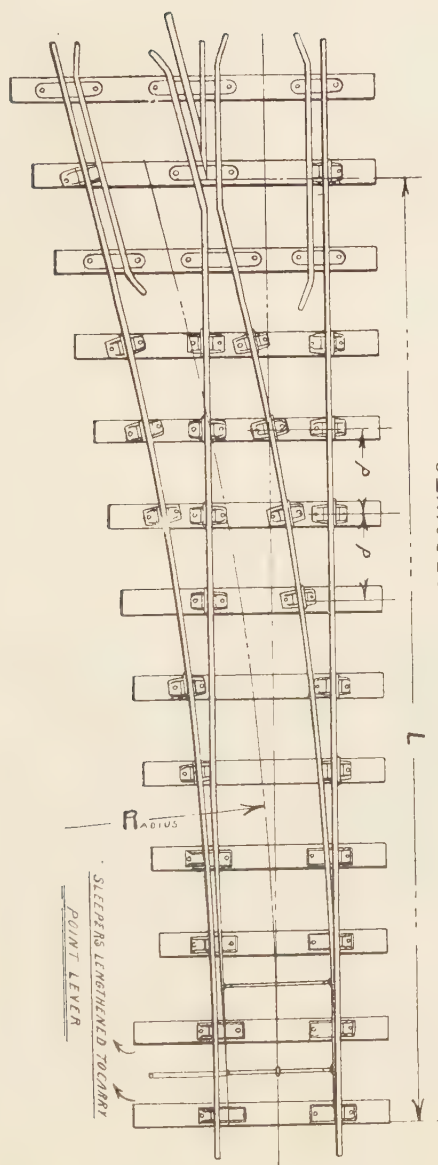


FIG. 2.—SHOWING NECESSITY  
OF PLACING THE CHECK RAILS  
IN PROPER POSITION.

once be seen that the check rail on A is unable to pull the wheels over, and the flange of the wheel running on H will strike the point of the frog as shown on Fig. 2. Of course, exactly the same thing will happen when running on the curve. The great importance of having D and H and F and G exactly in line with one another will also now be seen. If they were not in line, even the check rail would be unable to prevent the flanges striking the point of the frog.

Do not continue the chairs on the switch rails beyond where shown on the drawing, or the switch will not be sufficiently flexible. Owing to the natural spring in this rail, it is not necessary to cut the switches at the point G and H, as is done in railway practice.

The "hand" of a switch is decided by looking at it from the point C and noting whether the curve runs to the right or left. In the sketch Fig. 1 it runs to the left, therefore it is called a left-hand point or turnout. A crossover is simply two sets of points of the same "hand" laid down with the ends D, F of each point towards one another, and the nose of each set, laid the right distance apart, as shown on the crossover drawing, though it is usually found less trouble to have a complete set of crossover parts instead of two sets of point parts, as the two frogs are then fixed the correct distance apart, and so saves the "platelayer" much trouble.



| SCHEDULE OF PARTS |        |          |        |             |          |                    |
|-------------------|--------|----------|--------|-------------|----------|--------------------|
| GAUGE             | ANGLE  | SLEEPERS | CHAIRS | SLIDECHAIRS | L        | R <sub>ave</sub> P |
| 1 1/2"            | 1 IN 4 | 9        | 9      | 6           | 10       | 2.8 1/2            |
| 1 3/4"            | 1 IN 4 | 11       | 14     | 6           | 1-1 1/2  | 4-6 "              |
| 2"                | 1 IN 4 | 13       | 22     | 8           | 1-4 1/2  | 5-6 "              |
| 2 1/2"            | 1 IN 6 | 18       | 32     | 10          | 1-10 3/4 | 12-0 "             |
| 2 3/4"            | 1 IN 4 | 15       | 23     | 8           | 1-7 1/2  | 6-0 "              |
| 2 1/2"            | 1 IN 6 | 22       | 42     | 10          | 2-3 7/8  | 13-6 "             |

It will be noticed that the angle of the frog is entirely dependent on the radius of the curve of the switch. The smaller the radius the greater the angle. We have found after many years experience that the best angles are 1 in 4 and 1 in 6. With these two sizes we can accommodate any locomotive and nearly all arrangements of line, and we recommend the amateur platelayer not to depart from them if he can at all avoid it. The 1 in 6 is particularly suited for the scale models, indeed, most scale designs of locos will not run over the 1 in 4, which is specially made for the cheaper

designs. The 1 in 6 pattern is quite to scale, and will admirably suit any model with our scale pattern wheels and flanges.

Here we should like to point out one advantage of rail with white metal chairs keyed on with wooden keys, over the varieties without keys. With the latter the rails get slack in the chairs after a little use, or sometimes get so during process of being laid down, and it will be at once seen that with the rail slack in the chairs, and no means of tightening it, it becomes impossible to keep the various parts of the points in that correct relation to each other which we have shown to be so necessary to obtain perfect running over points and crossings.

Even if the amateur should decide to have one of the cheaper forms without keys for financial reasons, he should consider having scale points with chairs and keys if he would have a perfect running track.

### “THE CAPTAIN” ELECTRIC LOCOMOTIVE.

READERS interested in model electric locomotives who have not seen *The Captain* during the last few months, will do well to invest in the Oct., Nov., Dec., and January issues. Among other things, the articles by Mr. H. Greenly have included designs for a No. 1 gauge electric locomotive which has many novel points. Those who are at a loss to understand the principles upon which an electric motor works, and how the automatic reversing from any point in the track is effected, should study these articles. Methods of gearing



PHOTOGRAPH OF “THE CAPTAIN” STAND, MODEL ENGINEER EXHIBITION.

(Designed and made by Mr. Henry Greenly. Reproduced by permission of “The Captain.”)

the motors to the driving wheels, collecting shoes, switches, etc., come within the purview of these articles and provide both the novice and the experienced model maker with many ideas of interest and value.

The model made for *The Captain* stand is 5 feet 6 inches long, and comprises a station, tunnel, and the commencement of an overbridge. The retaining wall at the back is 8½” high. It is arched, and has many of the well-known advertisements affixed to it, those of *The Captain* of course predominating.



# Carriages & Wagons



## BOGIE FOR $1\frac{1}{2}$ " SCALE BOGIE WAGON.

BY H. GREENLY.

*(See also issue of August, 1909.)*

ON page 252 of our first volume the writer described the construction of the body for a model double bogie wagon intended for carrying one or two persons on a  $7\frac{1}{4}$ " gauge railway. This model has now been made by Mr. Gerhartz, and the bogies are being fitted. The design for the latter is shown on the accompanying double-page drawing.

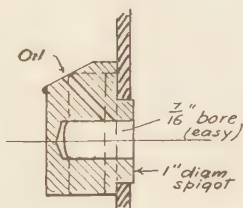
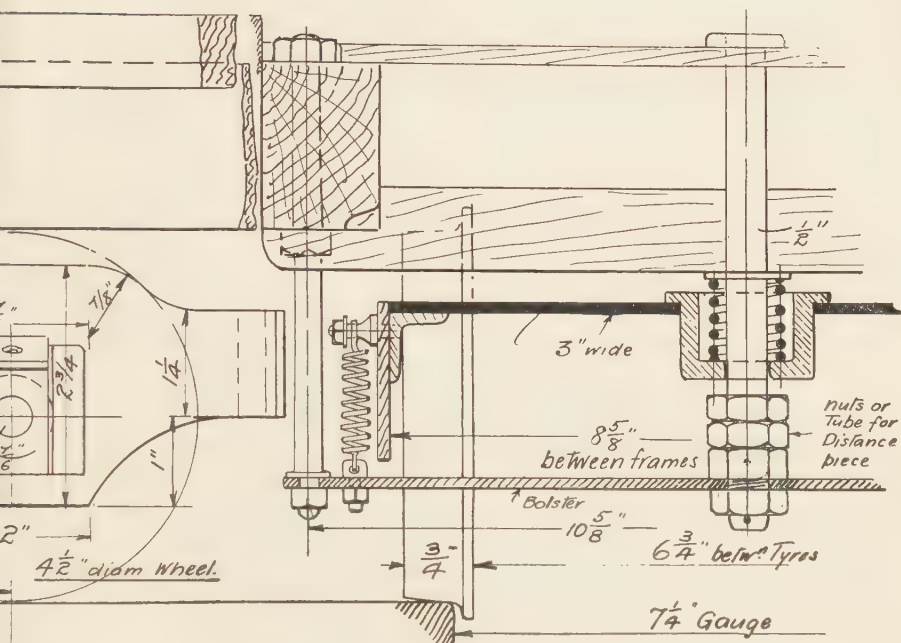
As suggested in the previous article, the axleboxes are not moveable in the frames, but the necessary flexibility of the bogie is provided by springing it on the bogie pin and from the bolster plate indicated on the drawings. The axleboxes are plain gunmetal castings, bored for the journal, and permanently screwed to the side-frames. They are turned with a spigot to fit an inch diameter hole drilled in the main frames.

The frame plates of the bogie are of steel,  $\frac{1}{8}$ " thick, and are  $14\frac{1}{4}$ " long with a maximum depth of  $2\frac{3}{4}$ ". The frames are placed  $8\frac{3}{8}$ " apart, and are joined at the ends by two plates 9" long  $\times$   $1\frac{1}{4}$ " deep. These are fitted to the side plates by angles as shown, countersunk screws being used to fix the side plates to the angles. The centre portions of the main frames are tied together by a horizontal stretcher-plate  $\frac{5}{16}$ " thick and 3" wide. This plate is bored with a  $1\frac{1}{2}$ " diameter hole in the centre to fit the cup-shaped bogie pin casting depicted in the cross-sectional view. This cup is bored  $1\frac{1}{8}$ ", and has a  $\frac{5}{16}$ " hole in the bottom to take the bogie pin, this hole being countersunk both sides so that the pin will not bind if the bogie should stand at a slight angle. The cup casting may be simply driven tightly into the hole in the cross stretcher-plate, or, if the work involved is not objected to, it may be provided with a square flange (say,  $2\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ "), and be riveted on with  $\frac{3}{16}$ " copper rivets. Another method, which perhaps would appeal mostly to those who may require several trucks, is to make a flanged and ribbed casting solid with the cup for the horizontal cross-stretcher. The flange should be 3" wide, and as deep as the side-frames are at the centre.

When the wheels and axles are finished, this completes the bogie, the axleboxes being bored to fit the  $\frac{1}{4}$ " journals easily, and also provided with an  $\frac{1}{8}$ " hole for oiling purposes, into the top of which a small cycle lubricator may be fitted if so desired. The wheels may be solid, but in any case a good deep flange should be provided.

There are many methods which might be adopted for flexibly connecting the body to the bogies. The simplest plan is a plain pin with a pad of rubber between the stretcher-plate of the bogie and the transverse beam provided





Section thro' Axle box

# DESIGN OF BOGIE FOR MODEL 7 $\frac{1}{4}$ " GAUGE EIGHT-WHEELED WELL TRUCK.

(See pages 15 and 18, and issue of  
August, 1909.)



in the framing up of the body: or the method suggested in the cross-section herewith, viz., the use of the cup-shaped centre-pin casting and a stout spiral spring may be used. While these methods prove quite successful in providing the maximum amount of flexibility in the movements of the bogies, users will find that a truck so fitted will not be any too stable. There is, with such an arrangement, a danger of the riders overturning, and some device is required to restrain the movement of the body in relation to the truck in a lateral direction. One method was described in our June issue in connection with the design for the bogies for the light-wheeled tenders of the latest "Little Giant" class 15" gauge locomotives. This, however, involves a cast bogie stretcher.

A better arrangement for the present case, the writer submits, is that shown in the drawings. The centrè-pin is adopted, but in addition side springs are fitted. The springs always take a certain amount of the load, but if the wagon is loaded too much on one side (by the rider leaning over or otherwise) they take up the excess of weight and restrain the tendency to tilt over. The springs are slung from a bolster-plate, which is rigidly fixed to the sole plates of the body by four  $\frac{3}{8}$ " diameter steel posts, and which is

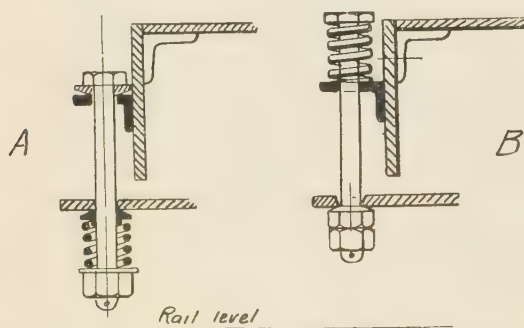


FIG. 2.—ALTERNATIVE METHODS OF ARRANGING THE SLING SPRINGS AT SIDES.

placed *under* the bogie frames. Therefore these springs also do the work of bringing the bogie into its normal condition after it has passed over a curve, and also reduce the tendency of the bogie to "hunt." To "hunt" is a term applied by railway engineers to the oscillation of a bogie round its centre pivot when the vehicle is on the straight, and which was noticeable on many of the L.N.W.R. bogie carriages a year or two ago, but which has since been remedied. The sling springs may be tensional springs as shown in the main drawing herewith. These springs should be the same as those used on the bogie for the model Great Central locomotive illustrated in our issue of April last. These springs are capable of safely withstanding a load of 21lbs. each. Twelve of these would therefore, with the central springs, easily suffice for two adult riders on the model wagon. Tensional springs may, however, be deemed objectionable, and the writer shows two alternative methods whereby the sling springs may be placed in compression, and should they fail the spring pins will take the load. The method at A brings the spring pins rather close to the rails and in danger of being damaged. The arrangement B is therefore to be preferred. In any case the spring pins should be as long as possible. Only two springs on each side are necessary if either of the compression methods shown in Fig. 2 are adopted.

## A MODEL AMERICAN TYPE LOCOMOTIVE.

MENTION was made of the "Pitmaston Moor Green" line in describing Mr. J. A. Holder's garden railway in our Christmas issue, but as the first-named model railway has been the subject of many articles in our contemporaries, we refrained from making any detailed reference to it. We however have received an interesting and hitherto unpublished picture of the "Yankee" locomotive Mr. Holder and his brother had made (Mr. Grimshaw, engineer) for the Pitmaston line. This engine is of 4-4-0 type so popular in America a decade ago, but it will be noticed the front end is provided with an ordinary buffer-plank, screw couplings and buffers, instead of the usual cow-catcher. This was necessary, as the model had to run with the other models, which of



MESSRS. J. A. & H. HOLDER'S 2" SCALE AMERICAN TYPE LOCOMOTIVE.

course are of standard English design. In other respects the locomotive is a typical "Yank," and looks very realistic taken against the model signal-box.

The engine is 10 $\frac{1}{4}$ " gauge and scales about 1 $\frac{3}{4}$ " to the foot. The locomotive has cylinders 2" bore  $\times$  3 $\frac{1}{2}$ " stroke, driving wheels 9" diameter. The boiler-barrel is 7 $\frac{1}{2}$ " diameter, 28" long, and has twelve  $\frac{3}{4}$ " tubes. The firebox is 7 $\frac{3}{4}$ " wide and 11 $\frac{1}{4}$ " long. The tender runs on two four-wheeled bogies, and the total length of the locomotive is 7' 6". On test it ran at just under 15 miles per hour, and covered in a non-stop run with three passengers a distance of 2 $\frac{3}{4}$  miles. The signal-box in the picture is approximately 3' 6" high.

## A VISIT TO MR. GERHARTZ'S $7\frac{1}{4}$ " GAUGE RAILWAY. By "LOWKO."

SPENDING a few days in Bradford a short time ago, Mr. Gerhartz kindly asked the writer if he would like to inspect his model railway. The offer was readily accepted, and a journey made to Mr. Gerhartz's home at Clifton Mount. The  $1\frac{1}{2}$ " scale locomotive is a 0-4-2 tank, built by Messrs. W. J. Bassett-Lowke & Co., and was fully described in our issue of September, 1909. The line is only a short one (about 100 feet), but extensions are in contemplation and the material already in hand. The present line terminates at one end in



STEAM-RAISING BY A FOOT BLOWER AND EXTENSION CHIMNEY.

an engine shed, shown in our photograph, where Mr. Gerhartz stores his locomotive and other tools and apparatus connected with his model railway.

Steam was raised from cold water by means of a foot-blower in about fifteen minutes. Several tests were made with the locomotive, and at a speed test over a measured distance, with Mr. Gerhartz driving, 9 miles per hour was recorded. The locomotive is very easy to handle, and steams splendidly; one injector working from 40 to 60lbs. and the other from 60 to 100 lbs. With reference to hauling capacity, the locomotive will pull easily a garden roller weighing about 15-cwt.

The rolling stock at present consists of a driver's truck only, but Mr. Gerhartz has had a large bogie truck made, the bogies of which are described in another part of this issue.



## MESSRS. W. H. HULL & SONS' SET-PIECE FOR CHRISTMAS WINDOW DISPLAY.

In view of the recent production of the various novelties connected with model railway work, Messrs. W. H. Hull & Sons have fitted up in one of their windows at the North-Western Arcade, Birmingham, a specially interesting set-piece, upon which is displayed their new wagons and model station fittings.

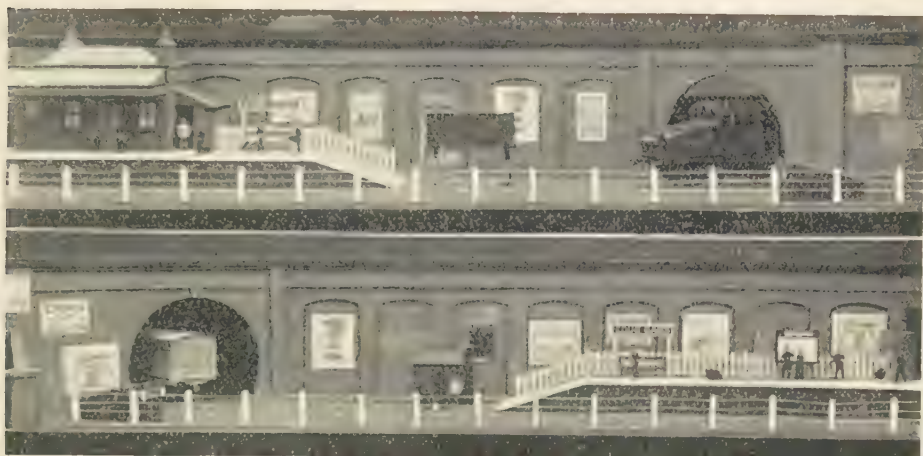


FIG. 1.—MESSRS W. H. HULL & SONS' WINDOW DISPLAY MODEL.  
(Top view right-hand half ; bottom view left-hand half.)



FIG. 2.—DETAIL VIEW OF SET-PIECE.

and other accessories. The set-piece is nearly 10 feet long, and is arranged with a tunnel at each end, the trains disappearing through the entrances under the stall-board of the window, as shown on the plan. The sidings are

not connected to the main line for simplicity's sake, but with a less restricted plan this could be easily arranged. The tunnel at the left hand side is provided with a projecting retaining wall. The retaining wall is painted in matt-finish, a dark-brown colour, against which the red and yellow colours of the station show up well. The fences are painted white.

The station is a standard one, with aluminium fences, as illustrated in our Nov. and Dec. issues. Messrs. Hull's station staff is also shown to advantage on this model, as will be seen in the detail photograph, Fig. 2. The other accessories are the new platelayers' huts, model seats, time-boards (note the porter showing the lady going to Messrs. Hull's to buy toys, the time of the next train to Birmingham), field advertisement boards, and the new "old style" buffer-stops which are now supplied in No. 0, 1 and 2 gauges.

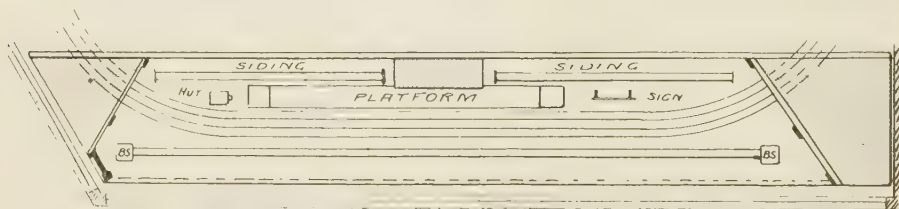
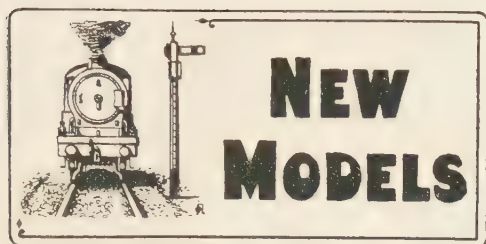


FIG. 3.—PLAN OF DISPLAY MODEL.

As such display models as these provide an unique attraction to a shop window, as well as forming a centre of interest in any model railway, Messrs. Hull & Sons and Messrs. W. J. Bassett-Lowke & Co. will at all times be pleased to quote for similar models. Set-piece and accessories are all the design of Mr. Henry Greenly. At the time of photographing the rails were not laid.

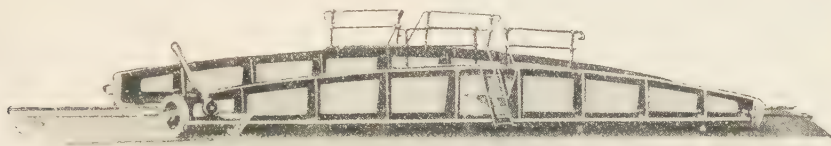
### ACCIDENTS ON BRITISH RAILWAYS.

A REPORT presented to the Board of Trade upon the accidents which occurred on railways in the United Kingdom during the year 1908 shows that during the year 1043 persons were killed and 7,984 injured by accidents due to the running of trains or the movement of railway vehicles, the average figures for the previous ten years being 1,155 killed and 7,036 injured. During the year no passengers lost their lives in accidents to trains in which they were travelling, and the number injured—283—is very low compared with previous years. The average numbers for the past ten years have been 21 killed and 626 injured. So far as the records extend, there has only been one previous year, 1901, in which no passengers were killed in train accidents. In the class of accidents caused by the movement of trains and railway vehicles, exclusive of train accidents, 102 passengers were killed and 2,242 injured, the corresponding averages for the ten years previous being 120 killed and 1,784 injured. The casualties to passengers in this class largely arise from the carelessness of the passengers themselves. Of servants of railway companies and contractors, 376 were killed and 5,976 injured. In this class of accidents the number killed shows a large decrease compared with the average for the previous ten years. In addition to accidents caused by the running of trains and the movement of railway vehicles, a large number of accidents unconnected with railway working occurred on railway premises. Accidents of this kind accounted for the death of 85 persons and injury to 20,501. The bulk of these accidents were due to misadventure, and comparatively few could be attributed to preventable causes.



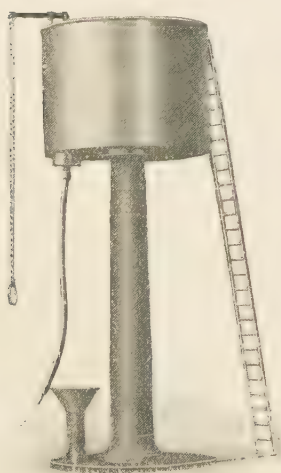
#### NO. 1 AND 2 GAUGE MODEL G.W.R. TURNTABLE.

AFTER many years of waiting, owners of indoor model railways are able at last to procure a scale model turntable that will turn an express locomotive. As will be seen by photograph, it is of G.W.R. pattern, and consists of main girders, balanced on a pivot in the centre. The great advantage of this turntable is that no pit or well is required, and it can be laid on any flat



surface. It has lever and locking bolt as in the prototype. The length of the turntable is 2' 1", and the width between girders 4 $\frac{1}{4}$ ", and is stocked for either 1 $\frac{3}{4}$ " or 2" gauge. Messrs. Bassett-Lowke & Co. have certainly made complete railways more possible by the introduction of this turntable, and we think it should have a record sale.

#### MODEL L.N.W.R. AND G.W.R. WATER TOWERS.



We feel compelled to draw our readers' attention to the new circular and square water towers introduced by Messrs. W. J. Bassett-Lowke & Co. this season. These models are very interesting and useful additions to any model railway. The model circular water tower is a simple form as used on the L. & N.W.R. and other railway companies in shunting yards and large stations. This model is made in two sizes, viz.:—(1) For gauge 0 railways; (2) for gauges 1, 2, and 3. Both sizes are fitted with a flexible connection with brass nozzle and a water valve operated by a chain from ground level. Dimensions are as follows:—No. 1, 9" high, tank 2 $\frac{1}{2}$ "  $\times$  3 $\frac{1}{2}$ " diameter; No. 2, 11 $\frac{1}{2}$ " high, tank 3 $\frac{1}{4}$ "  $\times$  4 $\frac{1}{4}$ " diameter.

CIRCULAR WATER TOWER.

The new model square water towers are also made in two sizes, viz.:—(1) For gauge 0 railways; (2) for railways gauges 1, 2, and 3.



This model is an exact replica of the water tower used on the G.W.R., in use at small stations where lengthy storage is required. The finish of this model water tower is imitation brickwork, with several well-known advertisements. A ladder is also provided to the tank, and the flexible pipe is attached to a swivelling arm. The valve is operated by means of a chain as in the circular water tank.



PHOTOGRAPH OF  
SAMPLE MODEL NO. 2 GAUGE  
SQUARE WATER TOWER.

This tower is modelled from the one to be seen at the Great Western Railway terminus station at Henley-on-Thames.

The photo does not show miniature advertisements, which are on the models as supplied.

Owners of model railways who have long asked for such models can now obtain, at a reasonable cost, this imposing addition to their outfit. The small size is as follows :—Tank  $1\frac{3}{4}$ " high  $\times$  5"  $\times$  4", height over all  $7\frac{1}{4}$ "; and the large-size tank 3" high  $\times$  8"  $\times$  6", height over all 13".



**CORRECT AMOUNT OF WATER AND SPIRIT FOR  
EXTERNALLY-FIRED LOCOMOTIVES.**

In response to numerous enquiries, we beg to give herewith the exact amount of water and spirit (in fluid ounces) required in the new types of externally-fired locomotives.

|                                          |    |    |    |    |      | Water. | Spirit.             |
|------------------------------------------|----|----|----|----|------|--------|---------------------|
| M.R. locomotive, gauge 1                 | .. | .. | .. | .. | ..   | 6 ozs. | $1\frac{1}{2}$ ozs. |
| L. & N.W.R. loco "Black Prince," gauge 1 | .. | .. | .. | .. | ..   | 5 "    | $1\frac{1}{4}$ "    |
| " " " " " " " " " "                      | "  | "  | "  | "  | 2 .. | 6 "    | $1\frac{1}{2}$ "    |
| " " " " " " " " " "                      | "  | "  | "  | "  | 3 .. | 12 "   | $2\frac{1}{2}$ "    |
| G.W.R. locomotive, gauge 1               | .. | .. | .. | .. | ..   | 5 "    | $1\frac{1}{4}$ "    |
| " " " " " " " " " "                      | "  | "  | "  | "  | "    | 10 "   | $2\frac{1}{2}$ "    |
| " " " " " " " " " "                      | "  | "  | "  | "  | "    | 16 "   | 3 "                 |

## MODEL SHUNTER'S COUPLING POLE.

A CORRESPONDENT, Mr. Frank Angell of Ipswich, in sending us a button-hook with the end bent to the shape shown in our sketch, says, "In further reference to our little chat recently at the Exhibition, I have pleasure in sending you the shunter's pole. I may say that I have been using it for some time, and find it very efficient. I can couple up carriages and trucks much more quickly

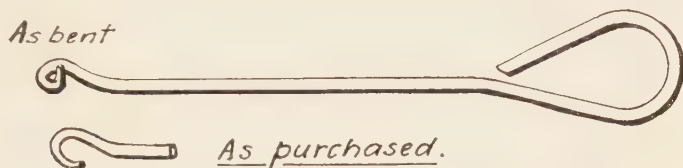


FIG. 1.—A BUTTON HOOK AS A MODEL SHUNTING POLE.

with it than with my fingers. It has one drawback, which can be easily remedied—it is a little too short in the handle, but the hook is the correct shape. I should like your report on it as Editors of *Model Railways*, and if you think it worth while, you might suggest that it be made commercially. It should cost only a few pence."

The good lady of the house, finding a bent button-hook about, promptly threw it away before we had an opportunity of photographing or sketching



FIG. 2.—MODEL SHUNTING POLE AS NOW BEING MADE COMMERCIALY.

it: however, we have made another one as nearly as we can to Mr. Angell's, and tried the same. The idea is a great success, and we have suggested its manufacture. The cost, we find, cannot (because of the limited demand) be brought down to the level of a penny button-hook, but we understand it can be sold for 4d. each, or 5d. post free. The design of handle is also made more in accordance with usual practice, and, as Mr. Angell suggests, the handle is longer. We append a sketch of the pole as now being made.



## NEW EXPRESS SERVICE: BIRMINGHAM—LONDON CITY.

WE are informed officially that, commencing February 1st, a new breakfast-car express will leave Wolverhampton 7-50 a.m., Birmingham 8-20 a.m., calling at Coventry, and arriving Broad Street 10-35 a.m. Return dining-car express leaves Broad Street 5-25, calling Coventry, arriving Birmingham 7-40 and Wolverhampton 8-5. We wonder if this is to be the commencement of the fight between two of our leading railway companies for the London-and-Birmingham passenger traffic. Perhaps we shall soon see a G.W.R. London-to-Birmingham diner leaving Moorgate Street underground station hauled by an electric locomotive?





**DESIGN FOR MODEL ENGINE SHED.**

BY H. GREENLY.

THE engine shed shown in the accompanying photograph is designed to suit all the latest scale model No. 1 gauge express locomotives, and is to the same general scale as the station illustrated in our November issue. The shed is 2' 2" long outside and  $8\frac{3}{4}$ " wide, and drawings will be included in the next issue. The shed being rather large, as wooden model railway buildings go, the sides are relieved by piers as shown in the photograph herewith. One of the sides are fitted with glass windows and the front end with doors. Where the locomotives are required to run right through the shed, the folding doors may be repeated at the back end; but for ordinary purposes these are not required. The shed is fitted with a bottom, on which a piece of rail should

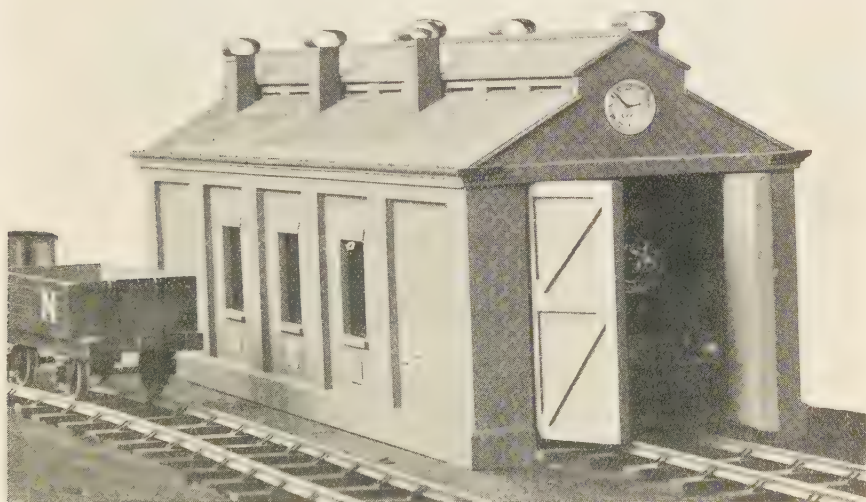


PHOTO OF NEW NO. 1 GAUGE ENGINE SHED.

be laid previously to fixing into place in the shed. The shed may then be used to carry the engine about, a fastening being provided on the doors to prevent the locomotive running out. The roof is fitted with ventilators, and the front end with a clock. This latter accessory may be simply drawn on paper, and have a bezel made of brass tube, but for those who do not mind the expense a cheap lady's watch may be employed; or, a dial and hands only may be purchased and fitted into the opening.

*(To be continued.)*

[Finished engine sheds may be obtained from Messrs. W. J. Bassett-Lowke & Co., or Messrs. Hull & Son's, at 35/- each. Working drawings and parts for building up are also in course of preparation.]



## HOME-MADE RAILS: A NOVEL RAIL GAUGE.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRs,

Having had occasion a few weeks ago to make a length of track for a siding, I got over the trouble as per enclosed sketches, which might prove of use to some reader of *Ours* who is in a similar difficulty. I can testify as to

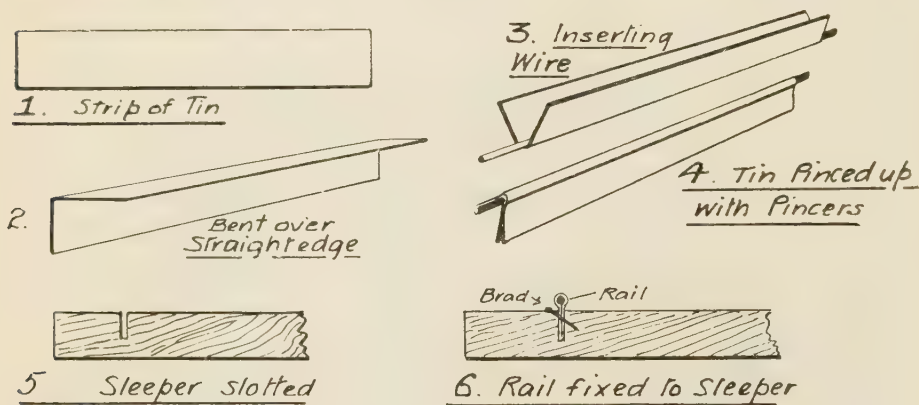


FIG. 1.—HOME-MADE RAILS.

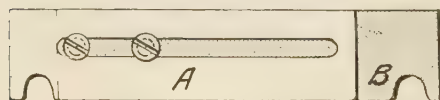


FIG. 2.—NOVEL RAIL GAUGE.

the wearing properties of rails made on this plan, having had some in use since 1901, and it is still as good as ever, and I have only just replaced it with steel rail and transferred it to a branch line. It is far superior and firmer than tin rail and tin sleeper. Care must be taken of course not to drive the rail down too far into the sawcut in the sleeper or the flanges will not clear the sleepers. The rail gauge is made out of a piece of steel cut from an old circular saw. It is in two pieces of the same length (A and B) with slots to fit the rails filed out with a rat-tail file. The face A slides on the two set screws so that the gauge can be adjusted for other gauges than the one for which it was made. The sketch shows it adjusted for  $1\frac{3}{4}$ " track. The set screws are screwed into plate B and the sketch is full-size of the rail gauge.

Yours very truly, RALPH D. SKELTON.

## MODEL 2" GAUGE WAGONS.

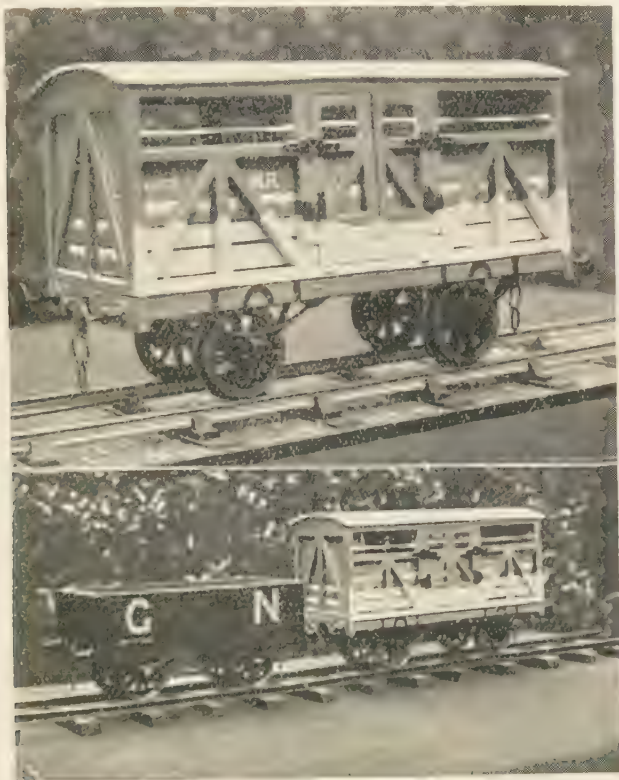
TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I enclose photographs of two  $\frac{7}{16}$ " scale 2" gauge model wagons which I have made entirely without drawings or any other assistance except that obtained from a copy of a catalogue.—Yours faithfully,

HARRINGAY, N.

S. T. PRICE.



MR. PRICE'S MODEL G.N.R. OPEN WAGON AND M.R. CATTLE TRUCK.

*Re* DIFFICULTY NO. 52.—MAKING CUTTINGS.TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

If it would be of interest to E.V.R. (Perth) we have had very successful results in making cuttings, tunnels, etc., from "Willesden paper." The two-ply material, not too thick, obtainable in pieces or rolls, was used. We cut off the length required and soak it in the bath for 12 to 24 hours; then, when soft, forcibly crumple it up as you would a paper ball. When spread out again, it is all lumps and rollers, and after moulding into the rough shape, propped up inside with old engine or rail boxes to support it, it dries to the required form, with hillocks, slopes, hollows, etc., all over it. Finish with

size, a few coats of paint splashed on in greens, browns, purples, etc. ; touch up any rugged, knobby bits with blue-grey for stones coming through heather or grass, and dab gum here and there for clumps of moss to "grow" on.

By shaping the edge, one can get the irregularly curved base line which redeems it from the inverted "pudding basin" appearance. Once it is dry it can be handled readily without losing shape.

I am coming up next week, with the manager of our line, Master John Sanders, who wants to renew his subscription to the magazine and his acquaintance with the fascinating models at the London shop.

You will excuse me writing, but I get so many "tips" from your magazine that I feel I must lend a hand to help a fellow enthusiast in any difficulty.

Yours sincerely,

SIDCUP.

CECIL M. SANDERS.

### A SOUTH AFRICAN READER'S MODEL "EXPERIMENT" LOCO.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

The following is a brief description of my model locomotive built from the castings and parts supplied by Messrs. W. J. Bassett-Lowke & Co. It is a model of L. & N.W. Railway's "Experiment."  $\frac{1}{2}$ " scale, and is built in accordance with the drawings sent out with the set, with the exception of



MR. C. W. ANDREWS' MODEL "EXPERIMENT" AND TRUCKS.

two things. It will be noticed that the oiler leading to the cylinders is fixed to the side of the smokebox ; this is done for convenience sake, as I found it rather awkward getting at it inside the smokebox. The valve gear is one of my own design and make, being two slip eccentrics fixed between the cranks and side-frames. The eccentrics each have two screws fixed into them, and as the crank comes round the one way it engages with one of the screws and



turns the eccentrics which operates the valves. To reverse it is only necessary to shut regulator, move engine about six inches in the required direction, open regulator, and—she's off. This caused a little wonder among my friends, as they could not make out how I reversed her until I explained the mechanism. In reversing, the crank comes round the other way and engages with the second screw, which causes the reverse motion.

This valve gear was the outcome of trying to finish Joy's valve gear too quickly, consequently I got something wrong, and after a few weeks fiddling with it I gave it up in despair and decided to try some other sort. The eccentric gear works exceedingly well, and the engine, tender, one truck and brake-van race along, even up the incline, at a dizzy speed. Before the engine and tender were painted I was persuaded to put them in an exhibition which was about to be held here. I did so, and was awarded gold medal.

The van in the photo is also built from a set of parts; but the truck is my own design and build, and is fitted with axleboxes and springs. So far I have only about 60 feet of track, laid with  $\frac{1}{4}$ " square iron. The incline is about 1 in 40, and with all the load I have room for (which is two bricks, one in the tender, and the other in the truck), she can start by herself on any part of the incline and quickly attains full speed. In conclusion, I must say this is my first attempt, and I have derived much pleasure in the building of it.

Yours truly,

DURBAN, NATAL.

C. W. ANDREWS.

[We can forgive our distant correspondent for having "re-discovered" the slip-eccentric valve motion. His method of fitting the stops, however, is somewhat novel. The slip gear is, of course, the most efficient motion that can be applied to a small model locomotive. We would recommend him to study the well-known book *The Model Locomotive: Its Design and Construction* for further particulars as to this and other gears.—THE EDITORS.]

#### L.Y.R. LOCOMOTIVE PERFORMANCE.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I welcome Mr. Gairn's remarks *re* loading, as he is doubtless better acquainted with the district than I am. My frequent experience was that expresses arriving at Manchester from the East were frequently divided, a light portion only running forward to Liverpool on the 40-minute services, while East-bound trains similarly were often "put together" at the Victoria Station by the addition of further coaches to the Liverpool portion. On six runs made last summer by East and West-bound trains the loads were:—Three bogies (80 tons) on two occasions: three bogies and one twelve-wheeled restaurant-car (120 tons) on two occasions; four bogies (105 tons); and six bogies (160 tons), the weights being in each case of vehicles loaded.

Yours faithfully,

LONDON.

C. J. ALLEN.

#### NOTES ON TIMING EXPRESS TRAINS.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I have read with great interest your "Notes on Express Train Timing." I should like to add that the Great Eastern Railway—I do not know whether other railways follow this example—mark up the distance (to the exact chain)

of each station from Liverpool Street on a footbridge, under-bridge, etc., in the station. This makes timing at night a comparatively simple matter, as the sound of a train passing under or over a bridge is easily heard, and, for the sake of comparing results, good enough for day-work. Of course the journey would have to be previously made by a slower train to obtain the necessary information. Congratulating you on the success of *Model Railways*,

Yours faithfully,

P. F. FINCH.

BISHOPS STORTFORD.

### ANSWERS TO CORRESPONDENTS.

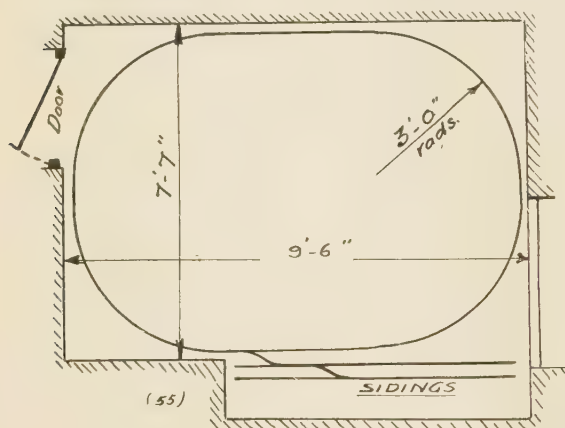
C.W.H. (Leeds).—The limitations of a black-and-white drawing—that is all.

R. G. W. (Muswell Hill).—We are not surprised that your acquaintance should claim to have originated the device used in the safety-valve mentioned. We have turned up a drawing of a locomotive published in an engineering journal before he was born, which shows the device he claims.

### READERS IN DIFFICULTIES.

DIFFICULTY NO. 55.—PLAN FOR SMALL ROOM.

W. G. Kelly writes :—Would you advise me on laying down an indoor railway. I send a plan of the available space. The gauge I would like to be  $1\frac{3}{4}$ ", but if you think the room is not large enough I shall have to content myself with an 0 gauge railway. Seeing the new gauge  $1\frac{3}{4}$ " Midland express you described in the October number, I thought of having a railway with the Midland engine. I saw one running at the Model Engineer Exhibition under steam, and that has further tempted me to buy one.



No. 55.—MODEL RAILWAY  
PLAN FOR A SMALL ROOM.

We suggest what we think is the only possible plan. You would do better in No. 0 gauge large radius track, and if the railway is to be laid down permanently you could adopt 36" radius curves, using the "Lowko" track materials, and laying them yourself on boards fixed round the walls. The sidings might be altered in many ways.

DIFFICULTY NO. 58.—ELECTRIC LOCO HAULING POWER.

E. B. B. (Palmer's Green, N.) writes :—I noticed in the September issue of *Model Railways* an illustration of a permanent magnet motor. If it were fitted with wheels 2-5/16" in diameter what number of bogie carriages would it pull?

The larger wheels would make it speedier with a light load. With heavy load, say, three bogie coaches, the current consumption would be slightly greater than with the smaller wheels. That is all that would happen.

# MODEL RAILWAYS AND LOCOMOTIVES



A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 2. FEBRUARY, 1910.

## BETWEEN OURSELVES.

THE "WAGON" COMPETITION, which closed on the last day of the old year, proved very popular, and we received hundreds of attempts to gain the prize offered by Messrs. Bassett-Lowke & Co. by naming the six most popular wagons over and above those already modelled by this firm. Over 200 different wagons were mentioned in the voting cards, and as in many cases readers have voted for wagons like the ballast, and gunpowder wagons running under various companies' initials, and in some instances left the companies' colours an open matter, we have added the votes for such vehicles together. Contrary to our expectations, the gunpowder van did not head the list. The order of popularity is as follows:—

- |                                    |                                      |
|------------------------------------|--------------------------------------|
| (1) <b>Boiler Trolley</b> (bogie). | (4) <b>Open wagon with tarpaulin</b> |
| (2) <b>Ballast wagon</b>           | (5) <b>Gunpowder van.</b>            |
| (3) <b>Motor-car van.</b>          | (6) <b>Gas tank truck.</b>           |

The next on the list are:—

- |                             |                                  |
|-----------------------------|----------------------------------|
| (7) Travelling crane.       | (12) L.S.W.R. open wagon.        |
| (8) M.R. covered truck.     | (13) Furniture van or truck.     |
| (9) { G.W.R. milk truck.    | (14) L.N.W.R. or M.R. 20-ton     |
| L.N.W.R. cattle truck.      | brake.                           |
| Salt union wagon.           | (15) Rail truck.                 |
| (10) { "Loco" coal wagon.   | (16) L.N.W.R. double-bolster     |
| 30-ton bogie covered goods. | timber truck.                    |
| (11) G.C.R. open wagon.     | (17) Tipping truck for iron ore. |
|                             | (18) Spier's coal truck.         |

The last-named vehicle is the only particular private owner's wagon which obtained a large number of votes.

Although one competitor (R.T., London, E.) mentions four out of the first six and also the seventh, he has been ruled out of order because he has given on his card eighteen names instead of the six we stipulated in the conditions of the Competition. This being the case,

Mr. F. W. CHADWICK,

KENT'S BANK,

GRANGE-OVER-SANDS,

is, we are of opinion, entitled to claim Messrs. W. J. Bassett-Lowke & Co.'s prize. His voting card gives Nos. 1, 2, 3, and 5, and also mentions No. 17. Messrs. T. Horn (Manchester), H. G. Kerr (Glasgow), W. H. Garlette (Acton), C. Cole (Fulham), E. V. Rowland (Bedford) and D. Madge (Essex), come very near to the winner.

We have obtained a few more copies of the now very scarce January, 1909, issue, and have had the same bound up in volumes, six of which are now available. Those readers who did not subscribe to our magazine in 1909 are therefore advised to send a postcard to our publisher, *Model Railways* Office, 112, High Holborn, asking him to reserve a copy. The price is 5/6, post free, and the first six postcards received will be the lucky ones.

All communications with respect to this journal should be addressed to *Model Railways and Locomotives*, at the new office, No. 112 High Holborn, London, W.C. We cannot guarantee attention to letters and orders addressed otherwise.

Readers whose *Model Railways and Locomotives* are from time to time described in our pages and who would like, for private purposes such as for printing on Xmas Cards, &c., to obtain the photo-blocks of their models may do so by arrangement with our Manager. They will be sold at about one-third their original cost, viz. : at an average price of 2/6 each.

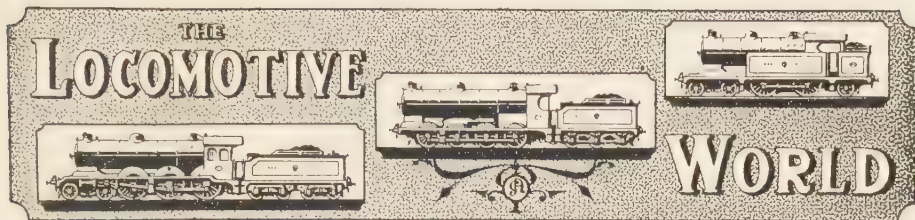
We have much pleasure in announcing that Messrs. Bassett-Lowke & Co. are moving to new and more commodious premises at 112, High Holborn. These new premises have about three times the floor area of No. 257, and a portion of the ground floor will be devoted to Show Room.

They will be opened during February, and we shall give full particulars of same in our next issue.



Mr. H. BILTON, of "Lewis Villa," Shirley Road, Enfield, will be pleased to hear from anyone in the neighbourhood interested in model railway work, etc., with a view to forming a model and debating club.





## THE EXPRESS LOCOMOTIVES OF THE L.S.W.R.

BY CECIL J. ALLEN.

(Continued from page 4).

THE first express engine of Mr. Drummond's design was of a type entirely novel in this country, although Mr. Manson, on the Glasgow and South-Western Railway of Scotland, had introduced an experimental engine on these lines—the first of its kind in Great Britain—a few months previously. These engines were of the four-cylinder non-compound variety, and that built by Mr. Drummond, which issued from Nine Elms Works in the autumn of 1897, was arranged after the fashion of Webb's three-cylinder compounds,



FIG. 2.—4-4-0 TYPE L.S.W.R. LOCOMOTIVE OF  
MR. DUGALD DRUMMOND'S DESIGN.

with the two inside cylinders driving on the leading axle, which was cranked, and the two outside cylinders driving on the trailing axle, the driving and trailing axles being uncoupled. The engine was thus virtually of the 4-2-2-0 type. The driving wheels were 6' 7" in diameter, and the four cylinders each had a diameter of 16½", with a stroke of 26". The boiler, although large at this period, possessing a heating surface of about 1,664 sq. feet, and working at a pressure of 175 lbs. per sq. in., was evidently not of sufficient capacity to supply the quantity of steam required by four cylinders at high pressure; little, indeed, is heard of the work of these engines on the road even at the present time. The cylinders of this engine were subsequently found to be too large, and were all lined up to a diameter of 14", while an enlarged type of boiler was fitted. The pioneer was numbered 720, and

was followed by five further of the same type, as altered, in the year 1901. From the time of the construction of these machines forwards the four-cylinder system has been in abeyance on the L. and S.W.R. until the construction of the giant 4-6-0 locomotives of 1905, to which I shall refer later.

The first, however, of what might be referred to as Mr. Drummond's standard designs was his two-cylinder simple 4-4-0 locomotive of 1898, which, although in its subsequent editions, and also in rebuilding, has been provided with a much larger boiler, is substantially the same in its principal dimensions as when first introduced. The driving wheels were 6' 7" in diameter, the cylinders 18½" diameter by 26" stroke, and the working pressure 175 lbs. to the sq. inch. The following year, 1899, saw the introduction of Mr. Drummond's well-known system of arranging cross water-tubes in the firebox; these were fitted to the locomotives of this type built in that year, and to every subsequent express engine which has been built under this gentleman's *régime*. The present standard 4-4-0 express locomotive on the London and South-Western Railway still has driving wheels 6' 7" in diameter, but the cylinders, although also of 26" stroke, have been increased in diameter by ½" to 19". The bogie wheels are 3' 7" in diameter. The driving wheel-base is considerable—10' 0"—and the total engine wheel-base of 23' 3" is large for an engine of this wheel arrangement. A large boiler, 4' 9½" in diameter, and pitched at 8' 6" from rail level, is now fitted; it contains, with the cross water-tubes in the firebox, a total heating surface of 1,550 sq. feet, and works at a pressure of 175 lbs. per sq. inch. The area of the fire-grate is 24 sq. feet. The engine weighs 54 tons in working order, of which the large proportion of 37 tons rests on the driving wheels, and is available for adhesion. A variety of this type of locomotive, identical in every particular with the foregoing, except as regards the driving wheels, which are only 6' 0" in diameter, has been constructed for service West of Salisbury, and on the Portsmouth line, in view of the heavy gradients.

The trains were so rapidly increasing in weight and speed, however, that a more powerful locomotive was urgently required, especially for the fastest expresses on the Salisbury, Exeter and Plymouth section of the line. Consequently, towards the close of 1905 Mr. Drummond introduced the monster 4-6-0 four-cylinder non-compound engines of the 330 class, which rank among the largest and most powerful locomotives in the country. In the first place it is notable that the four cylinders are actually of *smaller* dimensions than those supplied to the old 720 class previously described—16" diameter by 24" stroke, although the boiler has a steaming capacity well-nigh twice as great. It may be said, however, that a subsequent engine was built in 1907, numbered 335, in which the old diameter and stroke was reverted to, viz., 16½" by 26", but this latter engine is in all other dimensions substantially identical with those now being described. The driving wheels are 6' 0" in diameter, and the bogie wheels 3' 7" in diameter, the coupled wheelbase being 13' 4", and the total 26' 7". The inside cylinders, which are actuated by Stephenson's link motion, drive on the leading cranked axle, and the outside cylinders, with Walschaert gear, on the middle axle. The boiler is enormous, being of a maximum external diameter of 5' 9½", 13' 9" in length, and placed with its centre-line 9' 0" above rail level; the boiler tubes of which there are 340 in number of 1¼" diameter, provide 2,210 sq. feet of heating surface, the cross water-tubes in the firebox 357 sq. feet, and the firebox itself 160 sq. feet, making a total of 2,727 sq. feet. The area of the fire-grate is 31½ sq. feet, and the working pressure the L. and S.W. standard of 175 lbs. per sq. inch.

The engines weigh 73 tons in working order, of which 54 tons are available for adhesion.

In 1908 a further series of 4-6-0 four-cylinder simple locomotives were turned out of Nine Elms Works, in this case of rather smaller dimensions. They were five in all, numbered 453-457. In these engines the cylinders are still smaller in diameter—15" only—although the 26" stroke is still adhered to; the outside cylinders are fitted with piston-valves, and those inside with ordinary slide-valves. The boiler is considerably smaller, its inside diameter being only 4' 9½": the heating surface totals 1,920 sq. feet, of which 1,580 sq. feet contributed by the 247 boiler tubes, 200 sq. feet by the firebox cross water-tubes, and the remaining 140 sq. feet by the firebox itself. All the other dimensions are the same as those of the 4-6-0 locomotives previously described, but the weight in working order is in this case only 68 tons. These mammoths are giving an excellent account of themselves in the district for which they were designed, and to which they are confined.



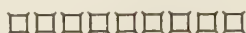
ONE OF THE LATEST L.S.W.R. 4-6-0 FOUR-CYLINDER LOCOMOTIVES.

The London and South-Western Railway is one of the few lines left which adheres to the use of the bogie or eight-wheeled tender. This is rendered necessary in view of the absence of water-troughs, in which respect the London and South-Western stands alone among the great English trunk lines. "Coming events cast their shadows before," however, and the tenders of the latest 4-6-0 locomotives have been fitted with water-pick-up apparatus, so that we may look for the introduction of this very necessary adjunct to a long non-stop run at an early date. The standard tender at the present time carries no less than 4,000 gallons of water, with 4 tons of coal, and weighs 45 tons in working order. In the tender of all Mr. Drummond's express locomotives is located the feed-water heating apparatus of his design, whereby a portion of the exhaust steam is utilised to heat the feed-water to a temperature of 180° F. before it is delivered to the boiler. An injector cannot be used for this purpose, of course, and has to be replaced by feed-pumps. Among the other "proprietary articles" for which the locomotive stock of the L. and S.W.R. is now famous, must be mentioned Mr. Drummond's patent spark arrester and fuel economiser, which is fitted in the smokebox of all his locomotives. The latter device is of undoubted advantage, as, with



the 4-4-0 locomotives on the heavy Salisbury and Exeter section of the line, a fuel consumption of from 30 to 33 lbs. per mile is rarely exceeded. The only remaining feature in locomotive design of note on the South-Western Railway is that of placing the safety-valves on the dome, a practice which, though uncommon, has the advantage of reducing the number of openings in the boiler. The principal advantage of the usual practice of placing the safety-valves on the firebox is, obviously, that they are thus situated immediately above the point where the steam is generated the most rapidly.

The locomotives of the London and South-Western Railway thus provide a subject of great interest to those interested in locomotive design and practice, owing particularly to the many features of originality which characterize the various types of locomotives now in service on that system. The same originality is also present in the external design of Mr. Drummond's locomotives, which, although perhaps barely so graceful as those of some of the great lines which have come under our consideration during the past months, yet bear the hall-mark of general neatness and elegance, in addition to an exceptionally massive appearance. Successful performance on the road, however, is of far more importance to the locomotive engineer than any considerations of externals, and in this respect Mr. Drummond's creations have proved themselves thoroughly worthy of their designer, and capable of fulfilling every demand that is made upon them in daily service.



## A 1½" GAUGE MODEL RAILWAY.

BY J. F. SELTMAN.

THIS railway differs from any other that has appeared in this magazine in that it is laid in a cellar. The cellar measures about 14 feet  $\times$  13½ feet, and has two doors and one window. Along each wall runs a shelf, firmly fixed



FIG. I.—MODEL NO. O GAUGE G.N.R. TRAIN IN CUTTING.

with iron brackets. The station is placed between the brickwork supporting the kitchen fireplace above. This brickwork (see B2, B3 on plan) being in the way, tunnels had to be bored through it to enable the line to continue.

The station, between the two brick walls, is about 4' 6" long, and has one



terminus and one through platform. It has subway stairs on each platform. These are easily made by simply cutting a square hole in the platform, letting in steps made of wood, and fixing railings round the opening.

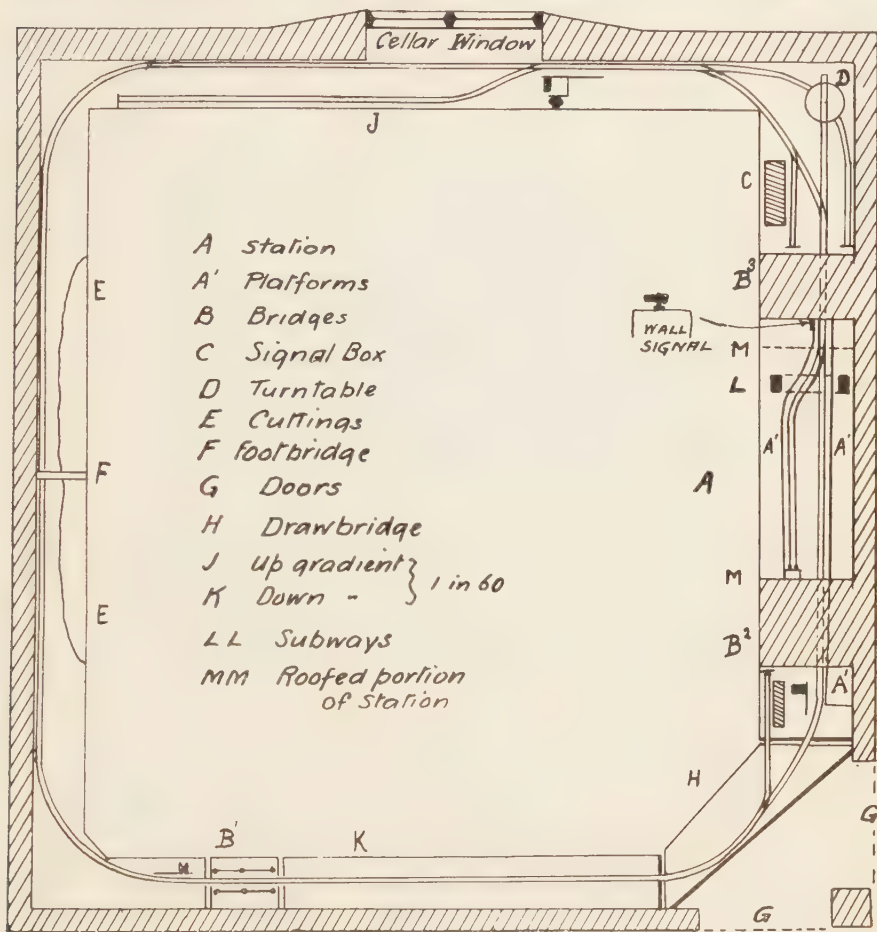


FIG. 2.—PLAN OF LINE.

A portion of the station is roofed in. This was made to look very realistic in the following manner: A box of "Meccano" having been procured, a number of angle-girders were fixed together to the length required. Along these 12" strips were fastened at equal distances, bent to form a semi-circle, and screwed to another row of angle-girders at the other side. The two lower quarters were then covered with sheet tin, and the top with gelatine, glass being found too heavy.

There are five sidings, all fitted with buffer-stops, the terminus line and the long siding having hydraulic stops.

The line is permanent throughout. Tinplate rails have been adopted, as small scale permanent way is rather large and expensive for an o gauge

line. The rails are fastened in this manner:—A hole is pierced in each sleeper, and the line then screwed to the shelf. Care had to be taken not to screw too tightly, or the gauge would have been diminished and the rolling stock would not run smoothly. The sleepers are painted black, thus obviating the disagreeable shiny appearance that tinplate rails invariably have. On the down grade (K on plan) the speed of a train became too high, and it usually left the rails at the bottom curve, in spite of the large radius curves in use. The writer was therefore obliged to fit guard-rails at this point,



FIG. 3.—MODEL PECKETT LOCOMOTIVE.

which he has described on page 167 in the May number, 1909, of this magazine. The piece of board at H is made to lift out, so as to afford an easy entrance for visitors to the railway.

The signalbox is placed outside the station at C on plan, and is made of wood. From here all the signals are controlled. The pulley wheels from "Meccano" have also been used for guiding the wires to their various

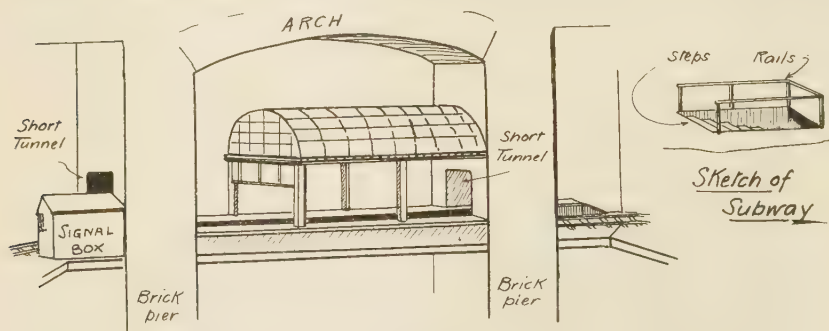


FIG. 4.—SKETCH OF ROOFED STATION MADE OF "MECCANO" MATERIALS, IN BRICK ARCHWAY.

signals. All the signals are made up from small scale parts, and all acting extremely well—even the distant, which works round several corners of the room, never failing to do its work. The signals worked at a long distance have an assisting counterbalance weight. There are 1 small starter, 1 bracket signal, 1 distant and a home. The shorter sidings are signalled by ground discs.

Round the edge of each shelf are nailed strips of Virginia cork and lengths of green linen. This looks very effective, and, as will be seen by the photographs, gives the impression of rocks and embankments.

There is a cutting at E, made by increasing the height of the bank of Virginia cork. At B<sup>1</sup> there is a small girder bridge spanning a gorge. Well-known advertisements are stuck on the walls in and near the station.

There are two engines, both driven by clockwork. The first, a G.N.R. "Atlantic" loco, is a very powerful engine, and hauls four eight-wheeled



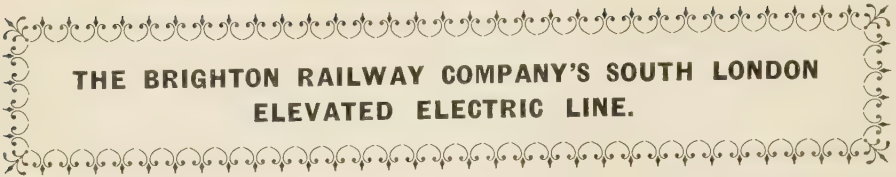
FIG. 5.—THE G.N.R. "ATLANTIC" AND TRAIN LEAVING THE STATION.

coaches twice round the whole system. The second is a "Peckett" saddle tank loco, specially painted in G.N.R. colours. It hauls three coaches, but is used mostly for goods traffic.

The rolling stock consists of ten wagons and four bogie coaches.

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[Since Mr. Seltman submitted the above article, we have taken an opportunity kindly offered to us of viewing this model railway. Mr. Seltman has lately eliminated most of the inclines as he found that he can obtain a longer run with one wind. Strange to relate, with a double-headed train the train will run 171 feet with 3 coaches and 6 goods vehicles, which is above the normal distance. With half the load one engine cannot be made to do this distance. To keep the speed within reasonable bounds, the owner attaches a long train at the commencement, and towards the end of the run slips half the train at junction J. The rear half is pushed into the siding as the train travels round the track again. Mr. Seltman is also considering relaying the main line with "Lowko" track and, for the time being, relegating the tin rail to sidings. The whole line will eventually be laid with this track.—THE EDITORS.]



## THE BRIGHTON RAILWAY COMPANY'S SOUTH LONDON ELEVATED ELECTRIC LINE.

THE completion of the electrification of the South London line is an achievement which we feel is too important to let pass without notice, and the following particulars of the working of the system should interest all those readers who are watching the progress of electric railway traction in this country. Personally we have always been of opinion that the third and fourth rail methods of supplying current to electric trains would sooner or later be considered inferior to the overhead high-tension systems, which have been so successfully used on the Continent.

The electric trains commenced running on the South London line on and from December 1st, 1909, and to distinguish this newly electrified line from the many London "tubes" it will be known as the South London Elevated Electric.

In consequence of the more frequent service on the South London line in connection therewith, numerous ordinary trains to and from London Bridge, Streatham, Tulse Hill, Sutton, Epsom, Clapham Junction, have been altered in timing and accelerated by the withdrawal of stoppages at stations between London Bridge and Peckham Rye. In addition, therefore, to the service of electric trains, Peckham Rye will enjoy an excellent service of fast steam trains.

The line now electrified is known as the South London line, and extends from Victoria to London Bridge, via Battersea Park, Wandsworth Road, Clapham Road, East Brixton, Denmark Hill, Peckham Rye, Queen's Road, Old Kent Road, and South Bermondsey, and is just under nine miles in length.

Inside Victoria Station seven lines are equipped with overhead construction, giving access to five platforms, and in London Bridge Station five platforms are similarly fitted.

The time taken by the steam trains from Victoria Station to London Bridge is 36 minutes; the electric trains reduce this to 24 minutes.

The acceleration of the new electric trains on the South London line is far superior to anything that can be realised in practice with steam. Thus the maximum speed of 30 to 35 miles an hour is reached respectively in some 30 to 35 seconds, whereas with steam, in order to reach the same speed, at least three times this amount of time is required.

The average distance on the South London line between stations is, in round figures, 4,600 feet. The line has a great many curves and gradients, and notwithstanding this the small average distance between stations, and the average speed of electric trains, not including stops, is just over 25 miles an hour, whilst if stops are included, the average speed is 22 miles an hour. It will be seen what an improvement electric service renders possible when it is understood that the average speed of the existing steam trains, including stops, is now only about 14 miles an hour.

The overhead conductors convey the current to the trains at a pressure of 6,600 volts., the construction of the overhead line, however, is of such a nature, and the precautions taken are so devised, that it is impossible for any person, in any way, to come in contact with the current at this pressure.



The electrical equipment of the car is so arranged that the mere fact of wishing to inspect any of the high-tension apparatus causes the whole of this to be connected to earth, and thus made safe before it becomes accessible.

The high-tension current is only to be got at in the high-tension chamber, which is of steel, in the motorman's compartments.

Experience has shown that the risks of fire due to short circuits are very much smaller in the case of a system of high tension alternating currents than where continuous currents are in use. The reason for this is that it is the amount of current (amperage) used, and not the total power, which creates fire risks; thus, in consequence of the very high voltage used, the current required by one of the South London electric trains, to start it, is only in the neighbourhood of 160 amperes, whilst in the case of a continuous current



FIG. 1.—L.B.S.C.R. ELECTRIC TRAIN NEAR PECKHAM RYE, SHOWING OVERHEAD CONSTRUCTION.

train, as generally used in this country, this current would be in the neighbourhood of 2,000 amps.

The safety device, called circuit-breakers, in the sub-stations and switch cabins, through which current passes which feeds the trains, are necessarily set to supply current for several trains—say, from four to five trains; under these circumstances short circuit, in the case of continuous current, might cause a current of anything up to 10,000 amperes to be used.

In the case of the alternating current system, as installed on the Brighton line, when the current reaches 800 amps. the circuit-breakers would certainly work and cut off the current. Under the normal construction of electric rolling stock, such currents would not be sufficient to cause serious fire,

whereas in the case of continuous current 10,000 amps. might be sufficient to cause a very serious conflagration.

Special care has been taken in the feeding arrangement by the use of boosting transformers to so arrange matters as to provide that the current will practically entirely return through special feeders supplied for this purpose and not to return to the rails and earth, and thus avoid any possible trouble due to electrolysis or cause any disturbances in existing telephone, telegraph and signal circuits. Experiments made up to date clearly demonstrate that the success of this experiment has been realised, and that no trouble in any form or shape has been experienced during the running of trains, which has been going on since January, 1909, last.

The erection of the overhead work has been carried out under exceptionally difficult circumstances, and the design of the construction was equally difficult.

The number of tracks to be equipped in both termini are considerable, and notwithstanding all these difficulties, the whole of the overhead construction was designed and erected without in any way interfering with the existing heavy steam traffic. The construction has been considered, by all engineers who have seen it, to be the most up-to-date ever adopted.

The repair shops are situated at Peckham Rye, and every tool is found there which may be necessary to maintain the electrical equipment, and to secure proper maintenance of the rolling stock.

Electric capstans and travelling cranes operated by single phase motors are installed, and one of them is fitted with a specially arranged device, by which a motor coach can be lifted off the truck and another complete motor truck substituted for it, the time for doing this, from the beginning of the operation until the train is ready to go out, not exceeding 40 minutes.

Telephonic communication exists between this repair shop and all the electrical cabins which have been installed along the South London line, as well as with all the signal cabins, and by this means it is anticipated that in the case of any failure of any portion of the system, it will be possible to rapidly communicate with the electrical department at Peckham Rye, and take the necessary steps to immediately put right any defect which may have been found, with a minimum delay to the traffic.

The single phase alternating system adopted is that which has been stated by the officials of the Midland Railway Co. to be found most suitable for their purpose, and which, after thorough investigation, they declare to be the only probable solution for the problem of railway electrification.

Dr. Gisbert Kapp, the President of the Institution of Electrical Engineers, and head of the electrical section of the Birmingham University, stated, that in his opinion, and in the opinions of most railway engineers throughout the world, the only possible system for railway electrification was the single phase one, and it is this system which has been adopted by the Brighton Railway Co. on the advice of its engineers.

The use of this system enables considerable extensions to be carried out without the necessity of building sub-stations and putting down an extensive feeding system, and there would be no difficulty if it were found advisable to extend it to Brighton, or even further.

In this connection it may be interesting to note that the decision of the Brighton Company to electrify on its system was arrived at before the Midland Company had considered electrification at all, and the credit, therefore, of being the first to select this system for both railways belongs to the

Brighton Company. The line they have equipped presents such difficulties, both as regards lay-out and erection, that it has taken much longer to equip than was originally anticipated.

The current for operating the present service is purchased in bulk from the London Electric Supply Corporation, and is delivered to the Brighton Company at Queen's Road by a duplicate system of mains, at which place it is measured and paid for. The London Electric Supply Co. have supplied four large generating units at their power station at Deptford, one of which is capable of delivering the total requirements to the railway, and it will thus be seen that ample reserve has been provided for the railway requirements.

The Board of Trade have most carefully inspected the whole line from one end to the other, and has declared itself satisfied, and passed the line for



FIG. 2.—VIEW OF INTERIOR OF CARRIAGE.

public service: this is the more remarkable as it is the first time such a system has been submitted to the Board of Trade for their approval, and reflects credit on all concerned in the electrification.

Experiments have shown that the acceleration obtainable with the single phase system adopted by the Brighton Railway is quite as good as anything that can be realised with continuous current: thus, on the level, a three-car train with its normal equipment can easily attain a speed of 25 miles an hour in 20 secs., an acceleration which is quite as good as anything that can normally be done by continuous current.



The characteristic of single phase motor, furthermore, allows this higher rate of acceleration to be obtained in such a way that it is lowest at starting and rises as the speed of the train increases.

The rolling stock adopted is of the side-door type which will enable passengers to have the privacy which at present exists, and which will also enable carriages to be quickly emptied and filled, and this type has not the inconvenience of the American corridor type used on the underground railways of London of being exceedingly draughty whenever the doors are opened, in which case every passenger who leaves the train inconveniences all the other passengers in the coach.

By slight alterations in the construction of this coach it is possible to obtain equal distribution throughout the carriage, so that passengers entering any compartment can find their way into any other compartment, instead of finding one compartment to be full while another remains comparatively empty. It is the first time this form of coach has been introduced into this country, although a somewhat similar construction has been used for many years on German railways. At the same time this form of coach is a great advance, both in design and decoration, of anything which has heretofore been done in connection with suburban traffic. The third-class coaches have eight passenger compartments, and seat seventy-two passengers. The first-class coach comprises nine compartments, and seats 74 passengers. The seating capacity per train is therefore 218 passengers. No second-class accommodation will be provided.

The illumination of the coach is particularly effective, and consists of four 10 c.p. lamps in groups of two for each compartment, each group being contained in a holophane globe; this globe, in consequence of special prisms ground on it, causes the light to be evenly distributed throughout the compartment, and realises a brilliant form of lighting without producing a blinding effect on the occupants of the carriage. It is believed that it is the first time this form of light has been adopted by a railway.

Everything that human forethought can do, has been done to provide for the comfort and safety of the passengers, and the public will find the newly electrified South London line a cheap, speedy, and comfortable means of reaching the City and West End. Novel arrangements with regard to the fares and season tickets are also in operation.



### A SUGGESTION TO OUR CONTRIBUTORS.

A correspondent, Mr. L. Hervé, writes:—"Supposing you were to institute occasional competitions (I say occasional, because *Model Railways* is primarily devoted, naturally, to models) for papers suggesting improvement on "real live" stock. Say you put the following—Suggest any improvements you would fit on L. & N.W.R. 'Precursors,' assuming you were 'chief,' with a view to improve their economic efficiency and reducing their extravagant coal-bill. Some areopagus could decide on the most ingenious of your readers. I give you the idea for what it is worth, but I personally think that occasionally, as I said, it might be a most interesting feature in the magazine." What do our readers think of this idea?





# MODEL LOCOMOTIVE CONSTRUCTION

## DESIGN FOR $3\frac{1}{4}$ " GAUGE MODEL L.N.W.R. "PRECURSOR."

(Continued from page 8.)

THE bottom of the exhaust pipe may be screwed with a tapered thread and the joint made steam-tight by smearing the threads with red-lead and oil. The top joint is made by a stuffing box and gland. The latter may be either a screwed gland or of the studded variety as shown in the drawing. The valves are fitted in a buckle, and the spindle is tailed through into a dummy gland.

The pistons are asbestos packed, and the valve-spindles and piston-rods have proper studded glands. Four slide bars are employed, and are supported at the outer end by a motion plate, which in the engine illustrated was built up out of sheet material.

Gunmetal cylinders are recommended, as they give least trouble should the engine not be used very frequently. The piston-rods and valve-spindles should also be made of bright drawn German silver. The slide bars, which are of square steel  $\frac{3}{8}$ "  $\times$   $\frac{1}{8}$ " section, are supported by circular spigots at both ends,  $\frac{3}{32}$ " holes being drilled in the motion plate and the cylinder cover lugs to fit these spigots. This method considerably reduces the work of fitting four slide bars, but of course success absolutely depends on the accurate marking out of the holes.

The bogie is based on the standard double radial truck introduced by Mr. Francis Webb on to all the new L.N.W.R. express passenger engines after the famous Preston accident. The principle of the truck is the same as the prototype in that it swings in curved slides, instead of rotating round a bogie pin and at the same time sliding laterally, as in the case of the Adams' bogie. The details, however, are much modified.

On the bottom of the cylinder is fixed the curved slide plate shown in the accompanying detail drawing, lugs being provided for this purpose in the cylinder body casting. This slide plate should be machined all over, the curved spigot being bolted on the face plate and turned to the proper radius. The same applies to the recess in the bogie stretcher, the two parts being made to engage without any binding, and yet without undue shake.

The bogie frames are of steel plate  $\frac{1}{16}$ " thick and 2" apart. It will be noticed that at the rear the portion over the axlebox is cut down to  $\frac{1}{16}$ " above the wheel centre. This is done to allow the frames to clear the slide bars,

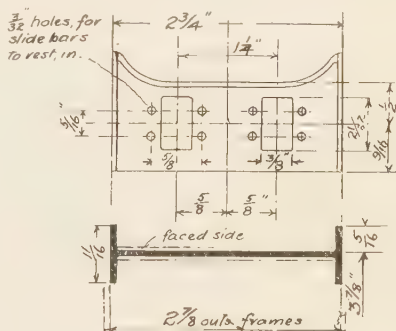
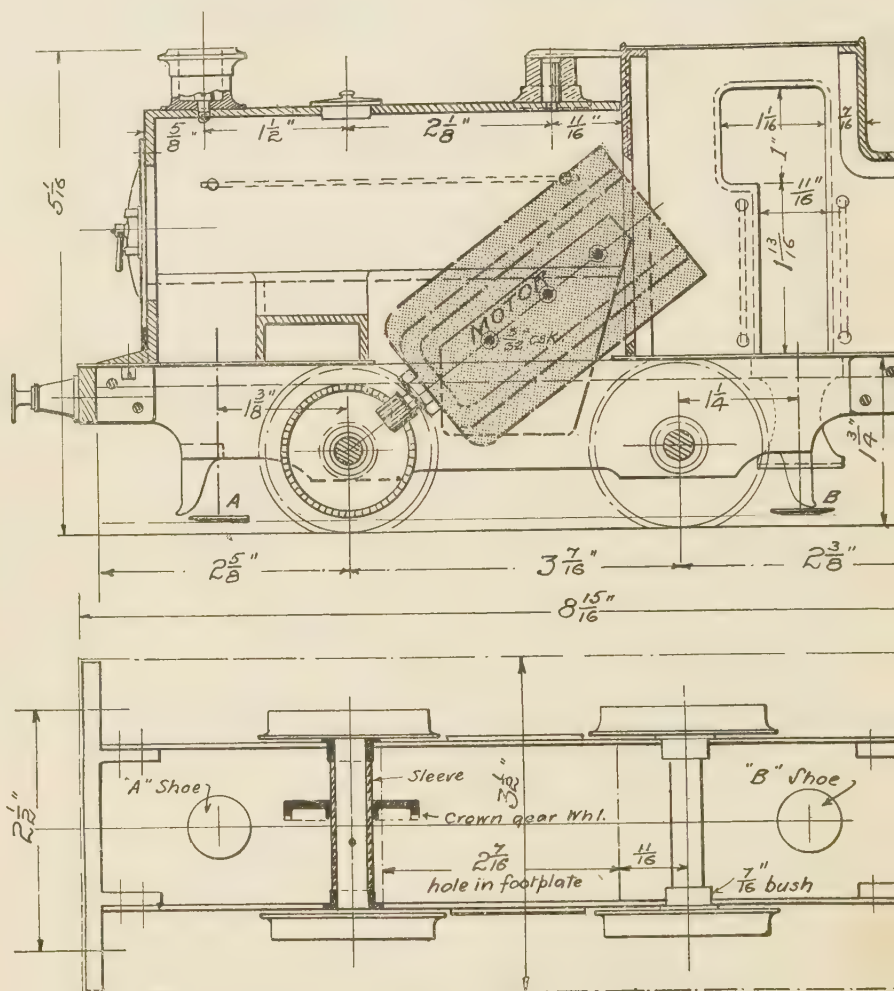
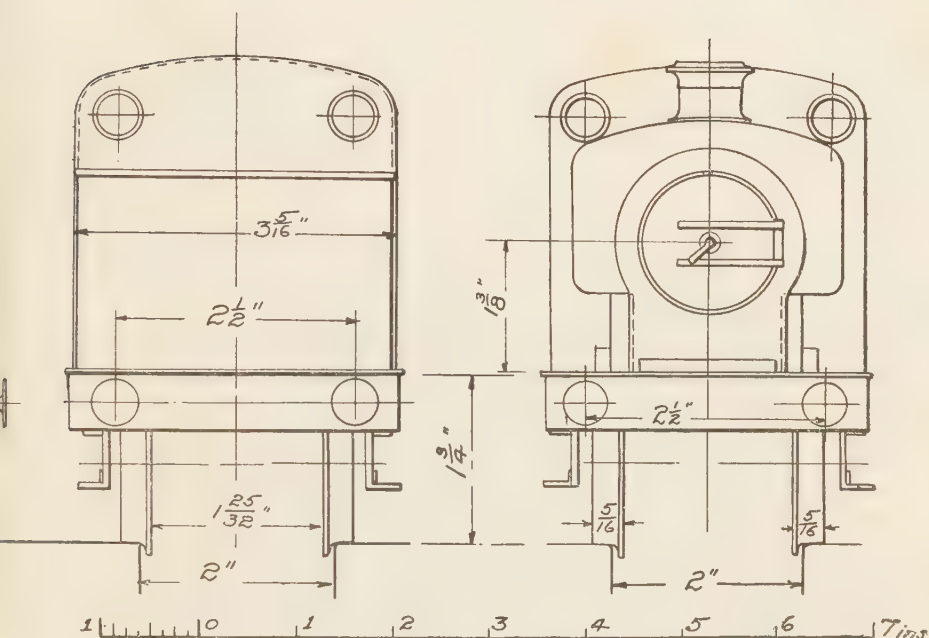


FIG. 5.—MOTION PLATE.





**A DESIGN FOR A MODEL ELECTRICALLY-DRIVEN GREAT  
NORTHERN RAILWAY TYPE SADDLE TANK SHUNTING  
LOCOMOTIVE,**

BY HENRY GREENLY.

SCALE OF MODEL,  $\frac{7}{16}$  INCHES TO ONE FOOT. GAUGE NO. 2,  
2 INCHES. DRAWING HALF FULL SIZE.

(For description see page 51).

the close proximity of which may be seen by a reference to the general arrangement drawing of the engine.

The equalizers are castings complete with dummy laminated springs and spring slings. The springing of the bogie axles is effected in one or both of the following methods. A spiral spring is placed under the central bracket

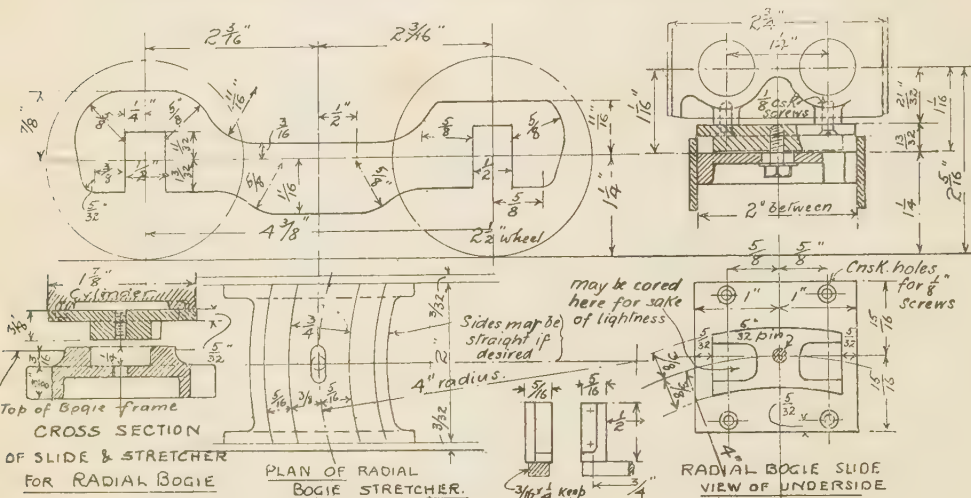


FIG. 6.—DETAILS OF RADIAL TRUCK FOR MODEL L.N.W.R. LOCOMOTIVE.

and is covered by a small brass cap. The spring pin is screwed into the equalizer, and is adjusted by the nut underneath the spiral spring. Or if this is deemed insufficient, the ends of the equalizer are bored half-way through for a short spiral spring, the pin fixed in top of the axlebox protruding through the equalizer in a hole counterbored to suit the size of the pin.

(To be continued.)

## NOTES ON MODEL ELECTRIC LOCOMOTIVE CONSTRUCTION.

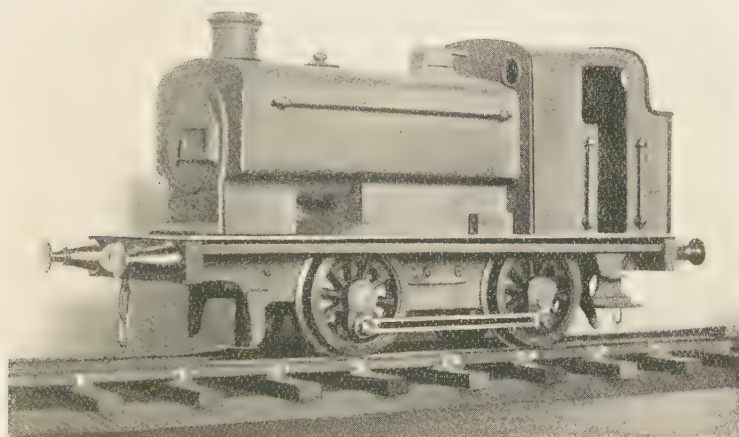
WITH the old radius tin-plate points and smaller types of model electric locomotives and tramcars there is no need to resort to any of the methods whereby the locomotive or car is fed with current during the whole time it is passing over the pair of points or crossing, which are adopted in the larger and more expensive models. With the advent of the new radius curve, and the still further enlarged standard curves of the "Lowko" track, two collecting shoes to bridge the gap in the central rail are really necessary. The auto-reversing motor of the permanent field magnet type also has the property of resisting the rotation of the armature if the current is shut off, and therefore it is always advisable not to have any break in the continuity of the supply current. Two collecting shoes are therefore to be desired.

Where two shoes are fitted it is imperative that the centre or live rail should be higher than the running rails, otherwise, if level, one shoe would touch the running rails when traversing every pair of points, the other shoe being in contact with the live rail and of course directly connected with the first-named shoe, there would, under such conditions, be a momentary short circuit with its attendant flash and damage to the connections and accumulator.



**A Design for an ELECTRIC MODEL G.N.R. SADDLE TANK LOCOMOTIVE.****I. INTRODUCTORY NOTE.**

THE many advantages of a four-wheeled tank engine for a model railway of restricted dimensions are to well known to be enlarged upon at this juncture. The trouble the writer has experienced, however, has been to satisfy himself as to type, and after careful consideration, bearing in mind the success of the "Peckett" locomotive as a prototype for a model, he has chosen the design for the saddle tank, as shown in the accompanying drawings and photographs as the most suitable and pleasing of those he has lately prepared. The basis of the design is the G.N.R. saddle tanks, but although the character is perhaps preserved, there is, of course, no G.N.R. engine in existence exactly the same as this model.



PHOTOGRAPH OF UNPAINTED MODEL.

The construction of the model has been reduced to the simplest form. The saddle tank and boiler is a single aluminium casting, the smokebox front, chimney, and safety valve and water filler being attached to this casting. The cab is a three-piece job. The front and back are gunmetal castings, over the flanges of which a sheet of tin, cut out to the proper shape and edged with half-round brass wire, is wrapped and soldered.

The motor is a permanent magnet motor of standard design, and for ordinary purpose a single reduction gear is employed. If the engine is required for hauling heavy loads and speed is not a consideration, a double reduction gear may be employed. This and other points will, however, be discussed at length.

Two shoes are fitted, as shown at A and B in the drawings on page 48. This enables the loco to traverse over points and crossings without any interruption to the flow of the current to the motor due to the necessary "breaks" in the centre conducting rail at these points.

The motor is supported by horn-plates fixed to the main frames. The footplates are in one piece, and are fixed down on the top of the main frames.

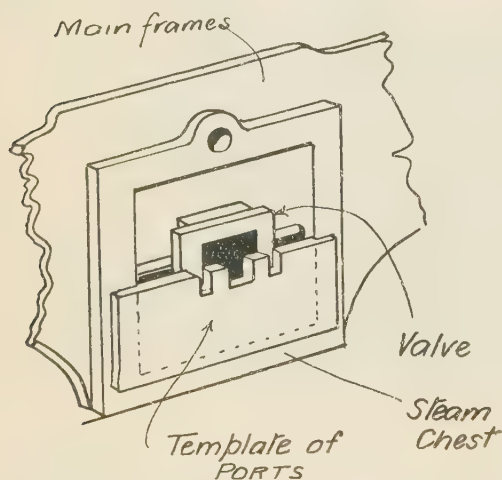
*(To be continued.)*

## MESSRS. STUART TURNER'S $3\frac{1}{4}$ " GAUGE G.N.R. "ATLANTIC" LOCOMOTIVE.

(Continued from page 26.)

WE include in this instalment of the articles a sketch of the steam-port template for setting the valves of this model, and in doing so give the credit of the idea to Mr. T. W. Averill, who adopted the method in building his model  $3\frac{1}{4}$ " gauge Midland. For this engine, however, the template was semicircular to fit the steam chests, which, as most readers know, in this case are round, and not square, as in the G.N.R. locomotive now under consideration.

In the sectional view of the trailing end on the opposite page, the firebox is shown to be of the standard Wootten type placed entirely behind the driving wheels. Cross water-tubes are shown, and we like them better than



SKETCH OF STEAM-PORT  
TEMPLATE FOR SETTING  
VALVES.

(See last issue.)

the field tubes sometimes employed, as they are not so likely to fail if the water is momentarily allowed to fall below the level of the firebox crown, and also the cross water-tubes form an excellent baffle to the flames of the "Primus" or other burner used to fire the model. The regulator is one which was designed before the advent of the standard regulators now obtainable, and consists of a disc with four holes which partially rotates over a similar valve face at the end of the collecting tube.

The tender runs on six wheels, and the axleboxes are sprung in the manner commonly employed for working models by small spiral springs concealed in the buckle of the cast laminated springs shown in the drawings supplied with the Castings. Brakes are fitted, worked from a screw handle in front of the coal plate.

The back portion of the tender is arranged to carry a circular fuel tank and the front portion of the feed water. In this tank is fitted a lever force-pump, connected to locomotive by the delivery pipe shown.



## HEADLIGHTS ON METROPOLITAN UNDERGROUND RAILWAY.

ALTHOUGH some modifications in the headlights of the Metropolitan Railway of London are noticeable since the "days of steam," the electrification of the line necessitating one or two important changes, the general scheme is about the same. White and purple lights are still employed. The single white light on the right-hand beam, as in diagram No. 1, denotes both up and down (inner and outer rail) circle trains which are on "all round" trips.



1



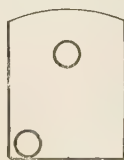
2

No. 1.—Continuous Circle trains in both directions.

No. 2.—Up and down Circle line trains Aldgate and South Kensington; down Moorgate to South Kensington Circle line trains.



3



4

No. 3.—Up Circle trains to Moorgate only; through up and down Moorgate, and down Aldgate to St. John's Wood line trains.

No. 4.—Up trains to Whitechapel.



5



6

No. 5.—Up trains Aldgate to St. John's Wood line.

No. 6.—Up Hammersmith or Addison Road trains to Whitechapel (Metro. coaches).

Circle trains on the up line (*i.e.*, the line to the city) going only as far as Moorgate Street, carry a purple light in place of the white, and an additional white light in the centre as Fig. 3. This headlight is also employed for all St. John's Wood line and Moorgate trains (up and down), and also from the down trains from Aldgate to St. John's Wood line. Those who know the geography of the line will therefore see that there is no possibility of error in dealing with the respective trains carrying this headlight.

Headlight No. 2 is almost as complicated at first sight. It is used for both up and down trains on the circle between Aldgate and South Kensington, and down circle trains from Moorgate to South Kensington.

Up through passenger trains from the St. John's Wood branch going to Aldgate also use these lights, as shown by figure No. 5.

No. 4 denotes a train from Hammersmith or Addison Road proceeding on the up line to Whitechapel. If these trains are of Metropolitan stock (in contradistinction to Hammersmith and City Joint stock we presume) No. 6 headlight is employed. No. 7 is used in the reverse direction for down



Aldgate or Whitechapel trains to Hammersmith made up of Metropolitan stock. Similar up trains to Aldgate carry No. 12. No. 8 is used for up Addison Road trains.

No. 11 is a counterpart of No. 4, the trains proceeding with this light only to Aldgate instead of Whitechapel.

Down trains to Hammersmith from Aldgate or Whitechapel are denoted by headlight No. 9. Addison Road trains from the same departure stations have the lights reversed as figure No. 10.

No. 7.—Down Hammersmith trains of Metro. stock.

No. 8.—Addison Road trains of Metro. stock from Aldgate or Whitechapel.



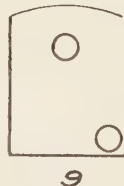
7



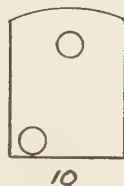
8

No. 9.—Aldgate or Whitechapel to Hammersmith.

No. 10.—Aldgate or Whitechapel to Addison Road.



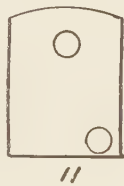
9



10

No. 11.—Hammersmith or Addison Road to Aldgate.

No. 12.—Ditto of Metro. stock.



11



12

No. 13.—Electric loco trains hauling G.W.R. trains to and from Aldgate.

No. 14.—G.W.R. (steam) passenger trains Addison Road to Paddington.



13

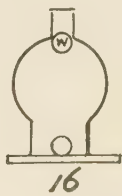


14

Headlight Fig. 13 is perhaps the most useful to readers interested in model electric railways, and represents the lights used in both up and down directions on Metro. electric locomotives hauling Great Western Railway "main line" trains over the underground section between Aldgate and Bishop's Road, Paddington.

The remaining steam trains on the underground section, the G.W.R. goods trains to Smithfield Market, which pass on to the "Met" at Bishop's Road carry lights shown in Fig. 16. The local passenger trains hauled by

steam locomotives between Paddington and Addison Road, and Notting Hill and Richmond, carry headlights depicted in diagrams No. 14 and 15 respectively. These lights are the same for both up and down trains. The lights



No. 15.—Steam trains Notting Hill and Richmond.

No. 16.—Steam G.W.R. train to and from Smithfield.

shown by the plain circle represent white, and those shaded black represent purple lights in actual practice.



### "THE EVENT OF 1910."

On a striking poster, the Brussels Exhibition authorities announce the forthcoming Exhibition in the above sentence. There is no doubt that the International and Universal Exhibition, to be held at Brussels this year, will take its place among the finest international exhibitions ever held. The leading British firms are sure to be well represented, as it is the first time a Government department has given any assistance to British exhibitors in a foreign exhibition.

The general arrangement of the exhibition is the departure from the usual scheme in exhibitions of this description. As is well known, it is the usual procedure to group exhibits in classes, but in the case of the Brussels Exhibition all exhibits (except machinery) will be arranged under their respective countries. Of course both systems have their advantages and disadvantages. The system of arranging them under countries encourages each nation to give as good a display as possible, but at the same time, if anyone wishes to make comparison between the difference in any certain branch of manufactures it is not so convenient.

We understand the Miniature Railways of Great Britain Ltd. have secured the site for a miniature railway in the grounds of the exhibition, and a novel arrangement of dealing with the traffic is being thought out by their Mr. E. A. Trenery, who will have sole charge of the arrangements.

The Miniature Railway at Blackpool is also to be removed this year, and it is most likely that another site will be taken at some other suitable place in the Northern Counties.



WE beg to remind our readers of the "Glosso" series of postcards of Caledonian Railway locomotives which can be obtained from the General Superintendent, Dept. 17, Caledonian Railway, Buchanan Street, Glasgow, in packets of six for 4d. post free. The new Model Clockwork Locomotives. "Cardean" and the West Coast Joint Carriages have proved a great success. Readers should therefore order before the stock is exhausted.

## THE USES OF A MODEL RAILWAY,

*as exemplified by*

MR. H. W. WESTLAKE.

AT the outset I feel that I must draw the attention of the reader to the fact that the model railway I have laid down, differs from most others in that it is not built and manipulated in the same way as is usually the case. My main idea was to provide myself with a hobby which should be instructive as well as pass away a spare hour. My interest does not end with running a model loco and train up and down a track with, say, an occasional variation

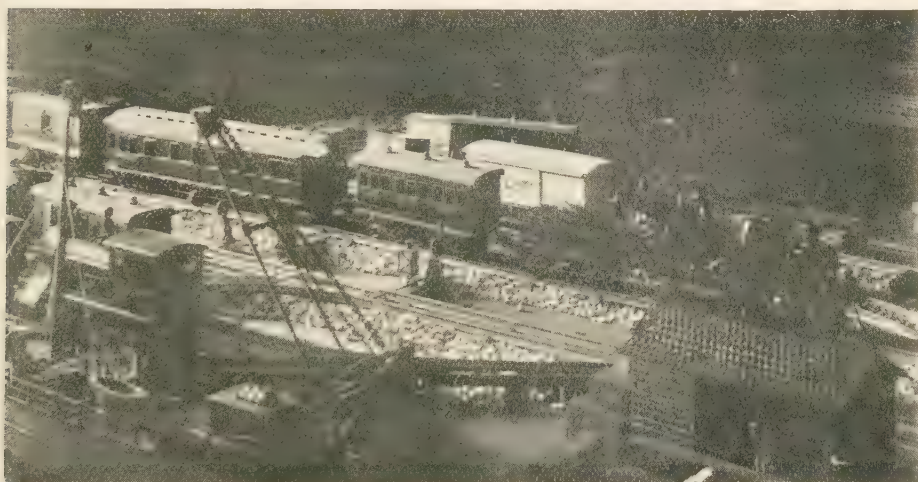


FIG. 1.—A VIEW OF MR. H. W. WESTLAKE'S MODEL RAILWAY  
AT HEYSHAM DOCKS.

*Trains meet the boats at this point.*

in the composition of the vehicles and perhaps in the exact destination of the train. I wished for a really *complete model* railway system based on the geographical disposition of one of our great lines. I therefore studied all the railway maps of the country, and finally decided upon the Midland Railway system as the best for my purpose. The main lines of this railway spread themselves out pretty well in all directions of the compass, and taking my own city (Sheffield) as the centre, the main plan of the Midland somewhat resembles the shape of the letter X, the four points spreading in the north-east to York, in the north-west to Carlisle, in the south-east to St. Pancras, and in the south-west to Bristol.

As the space at my disposal was limited, and the plan upon which I proposed to work so extensive, it left me no alternative but to employ the smallest gauge available, viz., No. 0,  $1\frac{1}{4}$ ".

My first essay in the construction of the railway was to lay down the main line from St. Pancras to Carlisle via Leicester, Sheffield and Leeds, and in addition the main line from Clay Cross to Bristol, via Derby and Birmingham. It goes almost without saying that it was altogether out of the question to attempt anything but a single-line track.

My first extension of the foregoing system was the line from Swinton to York. Next I added the line from Kettering, via Melton Mowbray and Nottingham, to Trowell. Then I decided that as Midland main line trains run through to both Edinburgh and Glasgow I would extend accordingly, although this meant introducing the lines of two other railways. To sum the matter up quickly, I have kept extending until my railway at present is as shown on the rough plan reproduced herewith, embracing the main lines

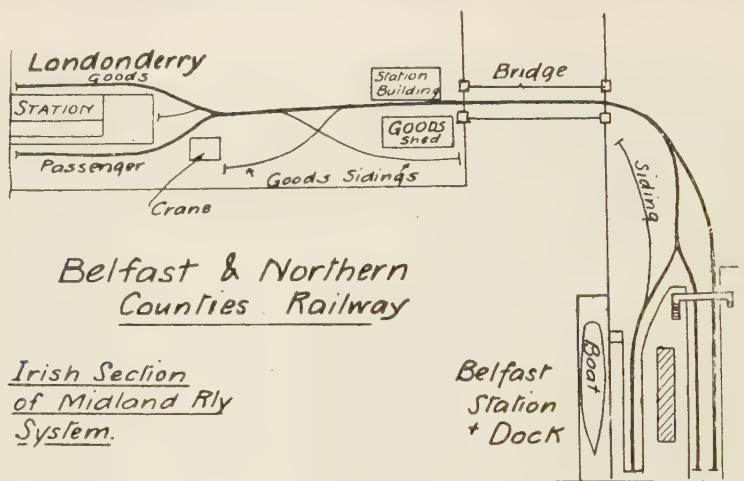


FIG. 2.—PLAN OF BELFAST AND NORTH COUNTRIES SECTION.

of the Midland Railway, together with portions (in one or two cases nearly all) of the following railways :—L. & S.W., Somerset and Dorset Joint Railway, Midland and South-Western, Cheshire lines, L. & Y. Railway, North-Eastern, Furness, North British, Glasgow and South-Western, Portpatrick and Wigtown Joint, and also the Midland and Belfast and Northern Counties Railway.

Although the system is so very extensive, it is compressed into the smallest possible compass, with the inevitable result that there is very little room for station buildings or platforms except on that portion representing the Belfast and Northern Counties Railway, the stations being designated by printed names gummed down at the side of the track at the desired points. I intend, however, to eventually make the platforms wherever it is possible to get them in without interfering with the ready and convenient movements of the trains.

So much for the construction. I will now attempt to explain how I use the model railway.

All trains are based as far as possible on actual trains as shown in the various companies' time-tables, whose systems are embraced. We will take a typical case, as follows :—



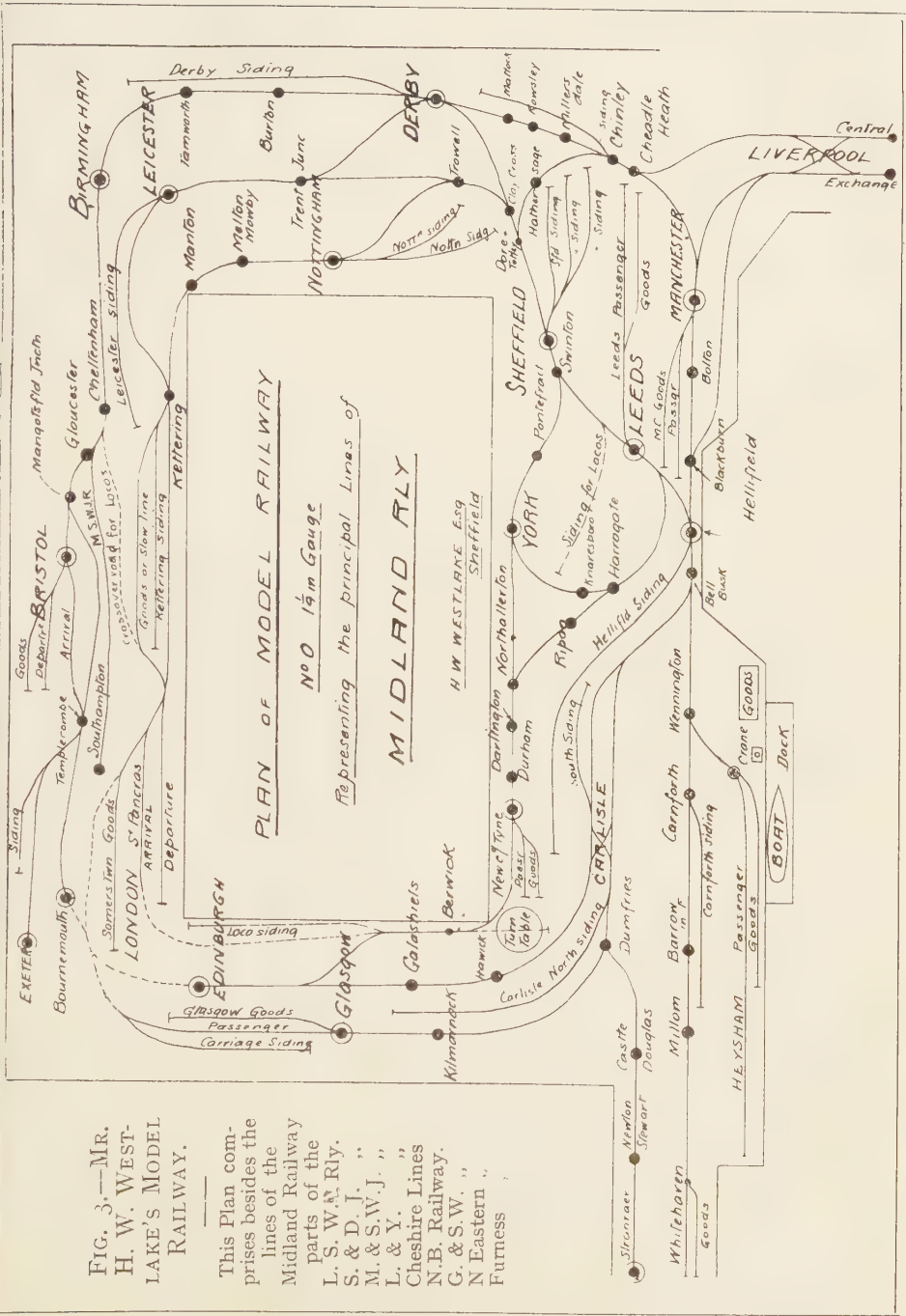


FIG. 3.—MR. H. W. WESTLAKE'S MODEL RAILWAY.

This Plan comprises besides the lines of the Midland Railway parts of the L. S. W. Rly. S. & D. J. " M. & S. W. J. " L. & Y. " Cheshire Lines N.B. Railway. G. & S. W. " N Eastern " Furness

- 1.—A train leaves Exeter for Templecombe, conveying Through Car Plymouth to Newcastle-on-Tyne. In this case I am compelled to depart from what actually occurs, as in real practice this through car travels direct to Bristol *viâ* G.W.R. ; but as my system does not contain that particular length of line, I have perforce to divert it in the way shown.
- 2.—A train leaves Bournemouth for Cheltenham, conveying through car Bournemouth to Leeds, and calls at Templecombe to attach the through car Plymouth to Newcastle.
- 3.—A train leaves Bristol for Leeds, calling at Cheltenham to attach the two through cars mentioned above, then calling at stations as shown in time-table, up to Derby, where the Newcastle car is detached, the Leeds portion then proceeding *viâ* Chesterfield, Eckington and Masbro to destination. This train also conveys through cars Bristol to Edinburgh and Glasgow.
- 4.—A train leaves Derby for York, conveying the through car Plymouth to Newcastle-on-Tyne, and travelling *viâ* Sheffield.
- 5.—A train leaves York for Newcastle, taking forward the last-mentioned through car.

This method is adopted throughout, but of course there are various other trains sandwiched in between the trains of above sequence, as time is taken into account, as far as practicable, especially in the case of all long-distance trains.

The effect of time is allowed for in the following way, taking for example a through train from London (St. Pancras) to Scotland, with through portions for Edinburgh and Glasgow. First the train is run as far as Leicester or Nottingham, according to the route by which it travels ; this represents in point of time, say,  $1\frac{3}{4}$  hours to  $2\frac{1}{2}$  hours. Therefore it follows that a train from Derby to Sheffield which might be time-tabled to leave Derby 10 minutes after the departure of the Scotch express from St. Pancras, would arrive in Sheffield before the Scotch train leaves Leicester or Nottingham for the North. To meet this difficulty I hold the Scotch train at Leicester or Nottingham until after the running of the Derby-to-Sheffield train ; this arrangement also applies to any other such train whose running time is similar. The result of this is that by slight necessary adjustments here and there all trains, whether passenger or otherwise, run in comparatively proper relation to one another, and the proper connections made.

Of course to carry out all the train movements correctly, and with a due regard for time allowances, &c., it requires a large amount of rolling stock, both passenger and goods ; so it will not be surprising when I say that I have now over 200 pieces, including—11 Locomotives, besides 2 Steamers for the services between Heysham and Belfast, and Stranraer and Larne.

*(To be continued).*

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### NEW CATALOGUE.

At the moment of going to press we have received a copy of Messrs. Bassett-Lowke & Co.'s Complete Catalogue for 1910.

This is again increased in size and is full of new and interesting lines. We hope to review it fully in our next issue. In the meantime we should advise all readers to obtain a copy. Post Free 7d.

# MODEL RAILWAY ENGINEERING.



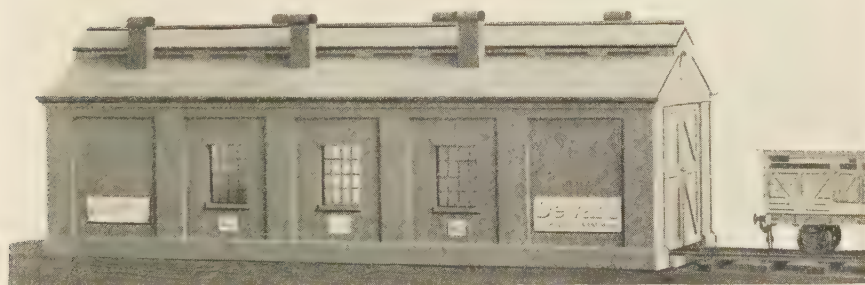
## DESIGN FOR MODEL ENGINE SHED.

BY H. GREENLY.

(Continued from page 27.)

THE accompanying photograph gives a better idea of the length of the engine shed than the perhaps more attractive picture reproduced in our last issue.

The ruling thickness for the wood used in the construction of this engine shed is  $\frac{7}{32}$ " as it leaves the saw and planing machine, and therefore when



BROADSIDE VIEW OF NO. 1 GAUGE MODEL LOCOMOTIVE SHED.

finally fitted together does not finish to more than  $\frac{3}{16}$ ". The bottom is perhaps an exception, as  $\frac{1}{4}$ " wood is better for this and suits the permanent way which abuts the rails running into the shed.

The side piers are planted on to the piece of timber forming the sides, the sketch Fig. 1 herewith showing the exact method of construction. This also

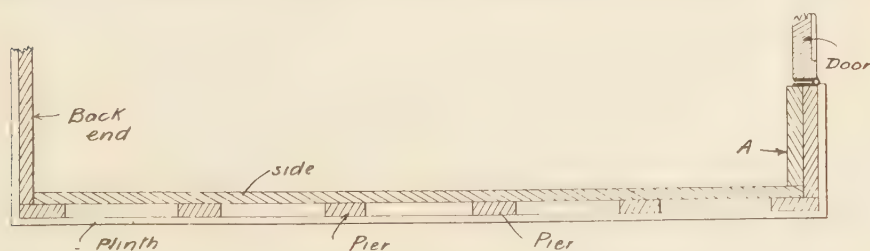


FIG. 1.—SECTIONAL PLAN, SHOWING HOW SIDES ARE BUILT UP.

shows how the ends are fixed, and the method of masking "end grains" which would otherwise be shown on the ends of the shed and are difficult to fill in

nicely during the painting operations. At the front end the jamb of the doorway is thickened inside by a vertical strip of wood as shown at A. This enables the door to be hung more strongly and also, for appearance sake, to be well recessed.

The guttering is fitted on the top of a "string course" made of  $\frac{3}{32}$ "  $\times$   $\frac{1}{2}$ " wood, and which runs all round the building. This may be omitted, but

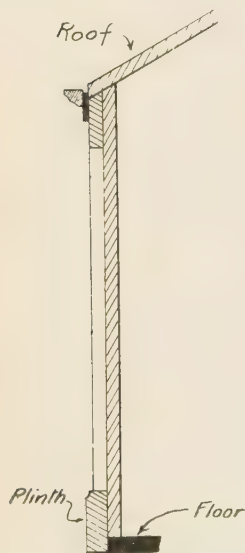


FIG. 3.—  
VERTICAL  
SECTION  
OF SIDE  
OF SHED.

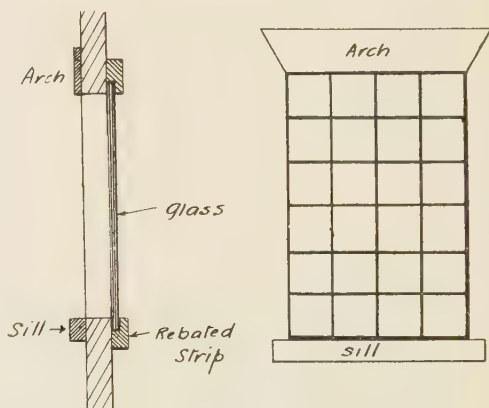


FIG. 6.—SECTION AND ELEVATION  
OF WINDOW.

the general effect will not be so good. The guttering is formed of an ovolo moulding, which can be obtained in small quantities at about one penny per foot run. It is planted on as shown in the detail sketch Fig. 5. The roof is made out of  $\frac{3}{32}$ " wood rebated at the edge to  $\frac{3}{32}$ " bare, as shown in Fig. 4.

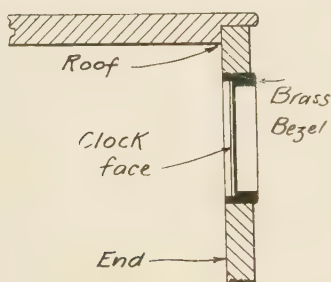


FIG. 4.—SHOWING REBATE OF ROOF AT  
GABLE END AND HOLE FOR CLOCK FACE.

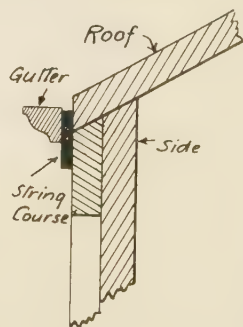


FIG. 5.—SKETCH SECTION  
AT EAVES OF ROOF.

This gives a less coarse appearance to the gable end, and at the same time makes a much stronger structure. A thin roof would be apt to spring badly unless ribs forming roof trusses are placed in the centre of the building.



The windows are placed in the spectator side only, but of course their number may be increased from three to ten if desired. The section at the windows is shown in Fig. 6. The sills can be made separately, painted a stone colour, and tacked on last. This method is better than fixing first and picking out with colour afterwards. The arch (flat or Dutch arch) over the window opening is indicated not in colour, but by glueing a thin shaped strip on to the sides, and then planing off until they are under  $\frac{1}{16}$ " thick. This gives the desired effect. Of course this must be done before fixing on the piers.

The clerestory roof and ventilated sides are made in a novel, if simple, manner. The sectional sketch Fig. 7 shows the general arrangement, the upper roof, unlike the main one, being made out of  $\frac{3}{32}$ " wood throughout, and not rebated. The ridge board is quite plain, and is  $\frac{1}{8}$ " thick.

The ventilated sides are made up out of  $\frac{5}{8}$ "  $\times$   $\frac{1}{8}$ " strips of wood, with blocks off the same size strip glued on at intervals, as shown in diagram Fig. 8. When set, the outer faces are planed off flush to an angle which will bring

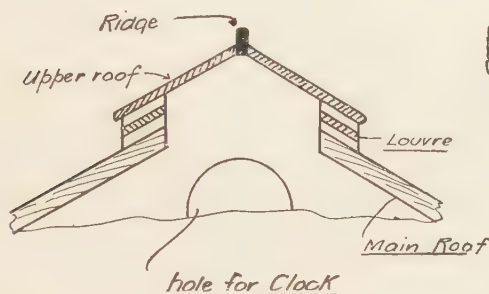


FIG. 7.—SECTION OF UPPER ROOF.

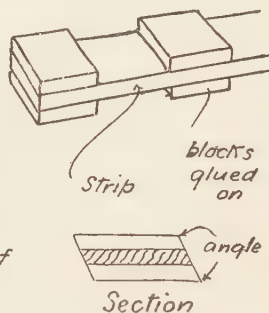


FIG. 8.—METHOD OF MAKING THE LOUVRE VENTILATORS.

them vertical when fixed to the raking main roof. The upper roof is then spiked down through these blocks. The doors are double, and have the outer braces, stiles and rails represented by strips of wood glued on to the face of the pieces forming the doors after the latter have been scribed with vertical lines  $\frac{1}{4}$ " apart.



### ANSWERS TO CORRESPONDENTS.

C. H. R. B. (Buenos Aires).—We cannot put prices of goods referred to in all our articles. The best way is to have your name down with our various advertisers for supply of all new lists as they come out.

B. de N. (Tooting).—The late Mr. Billington designed these six-coupled radial tank engines, and the late Mr. Stroudley the 0 4 2 type tanks. The 4-4-2's are the creations of Mr. Marsh. The leading coupling-rods of some of the 0-6-2's have, we suppose, been removed because they are working on services not requiring the adhesive weight of the six wheels. The Great Eastern did the same to certain locos working on the Blackwall section.

"Loco" (Keighly).—Fear not such remarks. If you also make a part of equipment you can afford to let them laugh: you are gaining both knowledge and skill. We have not much patience, however, with the "model maker" who cannot do anything towards the building of his model.

"EXPRESS" (Bradford).—Thanks for cutting; we will make use of it if possible.

L. O. H. (Stratford) and H. E. A. (Wandsworth).—Thanks for letter; photographs too small for reproduction.

F. P. (St. Leonards-on-Sea).—We shall not forget the L.B.S.C.R. locos. A Model G.C.R. chimney would suit better.

C. M. D.—Cannot give much hope of No. 3 gauge wagons in tin-plate.

J. T. (South Shields).—We cannot promise to do this. Write to H. Greenly, 1, Neston Road, Watford; he may be able to supply you with a blue-print. We think that you would not make a great success of sunk panelling in such a small model coach. We shall arrange an article on model coach building as soon as circumstances permit.

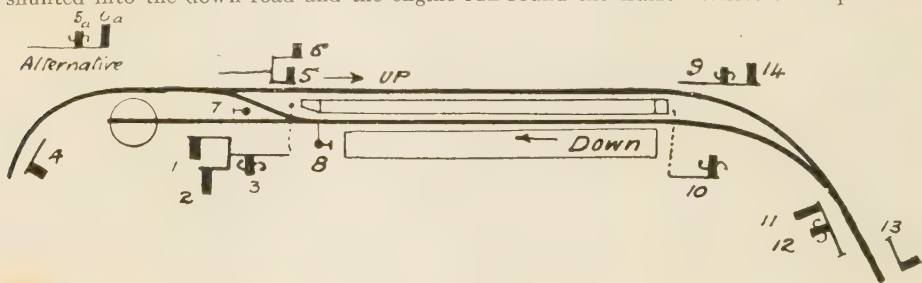
G. BUCKLEY (Ambleside).—Handbook returned through post.

## READERS IN DIFFICULTIES.

### DIFFICULTY No. 63.—SIGNALLING STATION PLAN.

G. R. S. W. (Devizes) writes:—I am in rather a difficulty over signalling a model line I am making (2" gauge). Ought I to have ground discs for backing from platforms, and is it necessary to signal the loco and carriage siding with the turntable in it.

You have rather over-signalled the station, and we show an arrangement whereby the signals are reduced to 14 from 15, not including distants in either case. We pre-suppose the down road is to be often used for a *starting* platform, some of the arrival trains being shunted into the down road and the engine run round the train. Where the expense of



STATION PLAN SHOWING SIGNALS.

#### List of Signals:

- |                               |                            |
|-------------------------------|----------------------------|
| No. 1—Starter from up road.   | No. 8—Down road to siding. |
| No. 2—Down starter.           | No. 9—Up shunting.         |
| No. 3—Down shunting.          | No. 10—Down backing-out.   |
| No. 4—Advance.                | No. 11—Down station home.  |
| No. 5 or 5a—Up train to down. | No. 12—Up shunting.        |
| No. 6 or 6a—Up station home.  | No. 13—Up advance.         |
| No. 7—Siding to down road.    | No. 14—Up starter.         |

so many signals is an objection, Nos. 5 or 5a, 9, 3, 12 may be dispensed with, and 6, 6a, 14, 2 and 11 serve the same purpose. The shunting signals should be marked S, and only allow movements of trains within the advance signals 4 and 13. Nos. 5a and 6a are alternative to 5 and 6, and we think preferable in every way. Passenger carrying trains (*i.e.*, not empties) therefore are controlled by signals 1, 2, 4, 6a, 14, 11 and 13. Yes, the ground disc 7 should be used for engines leaving the turntable. Catch or safety points working in conjunction with same are really required at this point.

# MODEL RAILWAYS AND LOCOMOTIVES



A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vo. II. No. 3.

MARCH, 1910.

## BETWEEN OURSELVES.

SINCE going to press with the centre portion of this issue, we have received some useful figures relative to the running capabilities and working costs of the N.E.R. petrol inspection car we describe on another page.

During the trials the inspection coach has run a distance of some 1,200 miles without a mishap of any kind, and speeds upwards of 55 miles per hour have been registered. Under all conditions of speed and road, owing to the low centre of gravity of the car, the riding has been perfectly steady and comfortable. It may be added, in conclusion, that the entire capital and running charges, including the wages of a permanent "chauffeur," have only worked out at the extremely low figure of 3d. per car mile, so that the interesting experiment of the construction of this car has evidently been fully justified, not only by its serviceability, but also by its economy in working.

We have received a copy of Mr. C. B. Byles' book on *The First Principles of Railway Signalling* from the publishers, and will take an early opportunity of reviewing the same. Mr. Byles is the signal engineer of the L. & Y. Railway, as well as a lecturer on railway economics at the University of Manchester, and therefore speaks with some authority. The book is both useful and interesting no less to the student of railway engineering than to the model enthusiast, and we can heartily recommend readers to become the possessor of a copy. The price is 3/- net, 3/3 post free, and it can be obtained from all booksellers, or direct from the *Railway Gazette* offices, Queen Anne's Chambers, Westminster, S.W.

MR. G. A. SEKON, the well-known railway writer, and Editor of the *Railway Magazine* and *Railway Year Book*, who inaugurated those publications nearly thirteen years ago and has conducted them up to the present time, has severed his connection with them. Mr. Sekon is producing on popular lines a new illustrated 6d. magazine—*The Railway and Travel Monthly*—which, as its title indicates, covers the whole field of locomotion, and will doubtless be welcomed by all interested in railways and railway engineering and operation, as well as by tourists and travellers generally.

We regret that the second instalment of the articles on the G.N.R. type saddle tank commenced in our last issue has been unavoidable crowded out of this number. Another feature we hoped to have inserted was a description of the workmanlike model 2" gauge station made for the window of Messrs. Bassett-Lowke's London branch. The photographs, taken in the works, on

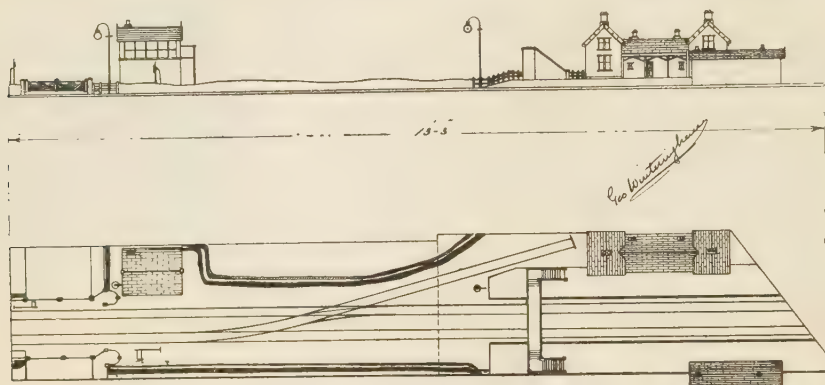
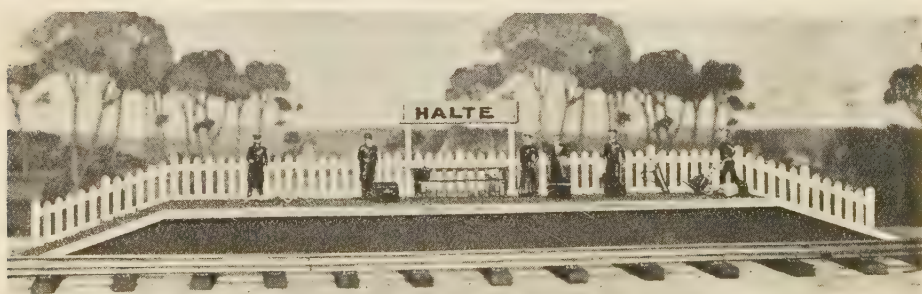


DIAGRAM OF MESSRS. BASSETT-LOWKE'S SHOP WINDOW MODEL.

account of poor lighting did not do the model full justice. This set-piece consists of a station, with buildings, in the G.N.R. style, complete with over-bridge, and further down the line is situate a signalbox and level-crossing complete with kissing gates, etc. The model is 13' long  $\times$  2' 9" wide.

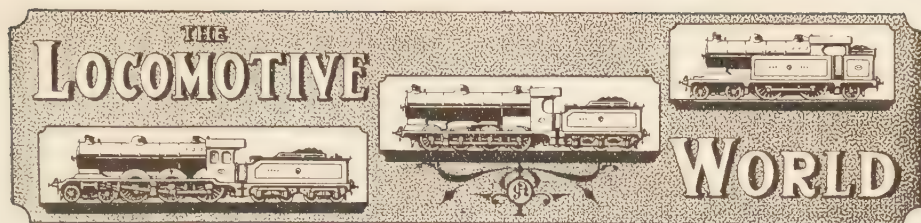
At the time of writing the fitting up of Messrs. Bassett-Lowke's fine new premises at No. 112 High Holborn is nearly complete, and customers who have delayed their purchases owing to the change of premises can now be certain of every attention being given to their orders in surroundings more comfortable than those which have obtained during the last month or so.

Anent Mr. Greenly's suggestion at the bottom of page 82 for the use of a suitable wall-paper frieze as scenery for the background of indoor model railways, we herewith reproduce a photograph of a 1 $\frac{3}{4}$ " gauge "Halte" taken with a piece of 10 $\frac{1}{2}$ " frieze. The cost of this frieze is about 7d. per yard. Mr.



Albert Dunn, St. Albans Road, Watford, who let Mr. Greenly have a few samples, will be able to supply the pattern shown in the photograph at the above price should readers find it difficult to obtain the same locally.





## THE EXPRESS LOCOMOTIVES OF THE NORTH-EASTERN RAILWAY.

BY CECIL J. ALLEN.

ONCE again we move northwards to take up the consideration of the express locomotive practice of a line which is better known to the average Londoner by reputation than by familiarity with its locomotives or rolling stock. It may be news to many, however, to learn that the North-Eastern Railway only ranks behind the London & North-Western, Great Western, and Midland lines as regards both wealth and mileage, and has an absolute monopoly in trade over a vast quarter of North-Eastern England bounded by Hull and Doncaster on the south, Leeds and Carlisle on the west, the Scottish border:

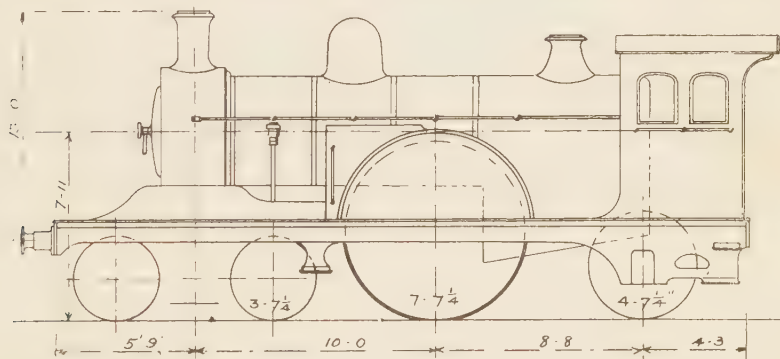


FIG. 1.—DIAGRAM OF ONE OF MR. T. W. WORSDELL'S COMPOUNDS, NO. 1520, CLASS J, RE-BUILT IN 1894 AS SIMPLE ENGINE.

on the north, and the sea-coast on the east. As this area includes all the famous coal-fields and ore-beds of the Cleveland district of Yorkshire, and of Durham and Northumberland, it follows that as regards mineral traffic especially the North-Eastern Railway ranks as almost the most important line in the kingdom. We shall see in later articles of the present series how this has influenced the design and construction of the various types of goods, mineral and shunting engines on the N.E.R., with which we are not at present concerned.

The North-Eastern Railway derives its principal importance as forming the centre link in East Coast Route, in partnership on the south with the Great Northern Railway, and on the north with the North British Railway. It is not a line of heavy grading—at least as regards the main Doncaster,

York, Newcastle and Berwick section—but any advantage in this respect is more than compensated for by the extreme weight of the trains, many of which, owing to the weight of the East Coast Joint stock, are frequently made up to total loads of 350 tons or more. There is a fairly hilly section between Darlington and Newcastle, and the very severe service slack in force over Durham Viaduct acts as a serious handicap to trains not calling at that town, more especially as the station is situated at the foot of the down-grade in either direction. Beyond Berwick, on the North British system, over which the North-Eastern Railway works the East Coast Joint expresses as far as Edinburgh by means of running powers, much harder and longer grades are met with, in places, as near Cockburnspath, as steep as 1 in 96 for five miles continuously.

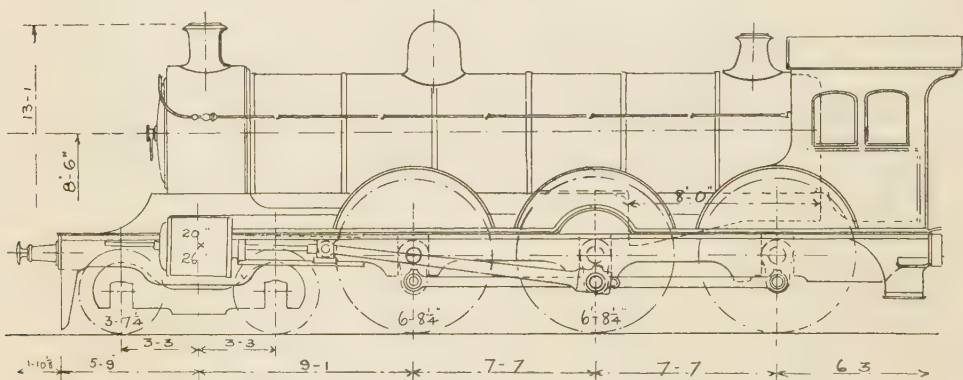


FIG. 2.—DIAGRAM OF MR. WILSON WORSDELL'S NO. 2111,  
CLASS S1, SIX-COUPLED EXPRESS LOCOMOTIVES.

The North-Eastern Railway Company is the proud owner of the fastest booked train in the country. This is scheduled to run from Darlington to York,  $44\frac{1}{4}$  miles, in 43 minutes, start-to-stop, including a very cautious approach to the latter town; this represents an average speed of 61.7 miles per hour. The excellence of this run is closely approached by one in the reverse direction, over the same stretch of line, in 45 minutes, in which case the train is heavier, and has the upward tendency of the road to contend with. For years the latter train was only allowed 44 minutes for the run, and thus came within the very limited collection of those booked in this country at over a mile-a-minute average, but from October last, with a view to better observance to punctuality, a much-needed minute was added to the schedule. A series of timings that I took recently with these two "fliers" will serve to show the marvellous punctuality observed by them in daily running, since the up train was on or before time on all the five occasions timed, and the down train only lost time on two out of ten occasions,  $\frac{1}{4}$  minute in one case, and  $\frac{3}{4}$  minute in the other! These are net times, making careful allowance for delays on such occasions as there were any. On one trip the up train actually covered the  $44\frac{1}{4}$  miles in  $42\frac{1}{4}$  minutes, *including a severe permanent way slack*; on another the down train made the run in less than 42 minutes, although with 200 tons behind the tender, and over a road very gradually rising almost the whole distance.

A yet more meritorious run, perhaps, even than these is that of the down

morning express from Leeds to Scotland, which is booked from York to Newcastle,  $80\frac{1}{2}$  miles, in 82 minutes. This booking, it must be remembered, includes the hilly section of the line between Darlington and Newcastle, the severe Durham slack, and a very cautious approach over the King Edward Bridge to Newcastle, so that extremely hard running is required, although the average start-to-stop is not so high as that of the two runs preceding. This train is then worked forward by the North-Eastern Railway to Edinburgh, covering this  $124\frac{1}{2}$  miles non-stop in the excellent time of 135 minutes. Among other meritorious runs might be mentioned one from Darlington to York in 47 minutes with a train invariably loaded to over 300 tons, and several others in 48 or 49 minutes. During the summer months the first portion of the down "Flying Scotchman" calls



*Photo published by]*

*[E. Pouteau.*

#### A THEATRICAL TRAIN, N. E. RLY., NEAR YORK. ENGINE NO. 758.

only at Doncaster and Newcastle between London and Edinburgh, and is worked by the North-Eastern Railway forward from Doncaster. This involves a special non-stop run, during these three months, of 112 miles between Doncaster and Newcastle, this being one of the very limited number of trains which miss York. Another of these has one of the most remarkable timings on the system; this is the special summer residential express between Leeds and Scarborough, covering the  $68\frac{3}{4}$  miles over difficult grades, with many service slacks, in 75 minutes.

I have perhaps occupied a somewhat lengthy section of the space at my disposal in describing the work performed by the express locomotives of the North-Eastern Railway, but it would need volumes of space to give an adequate description of the multivarious types of locomotives which are now doing honourable service on the expresses of the line. The North-Eastern Railway Locomotive Department deserves to rank with that of the Great Western as the exponent of the experimental in design, and it will require an article of at least two instalments to detail the types which have been built even of recent years, and have thus some claim to be described as standard. The North-Eastern Railway shares with the Great Western and Great Central



lines the distinction of having both the 4-4-0, 4-4-2 and 4-6-0 types of locomotive running in express service at one and the same time. The 4-6-0 type preceded the "Atlantic" in express service on the N.E.R., but engines of this class are now principally used for the working of express goods traffic, only appearing, as a rule, on the very heavy and rather slower express passenger trains; consequently the North-Eastern Railway is the only line which may be said to have abandoned the 4-6-0 type in favour of the "Atlantic." The North-Eastern Company is in line with its other two East Coast partners in its appreciation of the 4-4-2 type of locomotive for express service, and a further series of these giants are now under construction. Nevertheless the 4-4-0 type stands also in high favour, since during the past year a new series of this type has also been turned out, representing, constructionally, almost the utmost development in power possible for this wheel arrangement with the British loading gauge in operation.

In another sphere entirely the locomotive practice of the North-Eastern Railway deserves to rank as noteworthy, and that is in connection with experimental compounding. The name of the last locomotive superintendent of the N.E.R., Mr. T. W. Worsdell, will always be associated with the two-cylinder system of compounding, with which he first fitted ten locomotives on the Great Eastern Railway, afterwards, on removing to the locomotive superintendence of the North-Eastern Railway, equipping a large number of both passenger and goods locomotives in the same manner. When his brother, Mr. Wilson Worsdell, succeeded him in that office in 1890, which he still holds, he abandoned the practice as a constructional feature, except in the case of one locomotive in the first series of 4-4-0 engines which he built. This was the now familiar 1619, which first appeared as a two-cylinder compound with both cylinders placed inside the frames, and the valves outside, encased in ugly box-shaped projections on either side of the smokebox. For eight years she ran in this form, but in 1898, after a prolonged sojourn in Gateshead Works, she appeared in an entirely new guise, both internal and external. She had been transformed into a three-cylinder compound on Smith's system, that is, with one high-pressure cylinder inside and two low-pressure cylinders outside the frames, all approximately of the same size, and thus on exactly the opposite principle to Webb's system. The external transformation was even more remarkable, the engine becoming thenceforward one of the most graceful 4-4-0 locomotives yet constructed in this country, and a special favourite with the model engineer. Beyond this, however, the chief interest about this machine lies in the fact that it is the only locomotive extant which has, during its life, been fitted with two entirely different forms of compounding.

From that time forward the compound system was in abeyance until 1906, when two entirely new four-cylinder compound "Atlantic" locomotives issued from Gateshead Works, about which I shall have more to say as I reach them in their chronological order. I think it will meet the purposes of this article, as describing the present standard express locomotives of the North-Eastern Railway, if we commence at the well-known 4-4-0 R class of 1899, following this with the six-coupled express locomotives of 1900, the "Atlantic" or V class of 1904, the compound "Atlantics," class 4CC, of 1906, and finally the large new 4-4-0 locomotives of class R1, built in 1909. I hope to deal with each of these types in detail in next month's issue of *Model Railways*.

(To be continued.)



## THE USES OF A MODEL RAILWAY,

*as exemplified by*

MR. H. W. WESTLAKE.

*(Continued from page 60).*

[WE would call the attention of new readers to the comprehensive plan given in the last issue, and also mention that Mr. Westlake's address is 532, Abbeydale Road, Sheffield, should anyone wish to avail themselves of his offer of further information.—EDITORS *Model Railways*.]

The time-table is so arranged that every portion of the entire system is properly provided with at least one stopping passenger, and also one stopping goods train, in each direction in every complete round of train movements, the complete round consisting of over two hundred distinct trains. Readers will naturally say, "But that seems almost impossible to carry out efficiently and without a bungling of matters," but I ensure absolute regularity and correct sequence by the following method. Firstly, every separate train is numbered plainly from 1 upwards. Secondly, each train of any description is provided with its own working card, on which the following particulars are clearly shown :—

- (a) The times of leaving departure station and arrival at destination, together with arrival and departure times at certain principal intermediate stations ;
- (b) The names of all stations at which the train calls ;
- (c) Details of any through cars or wagons which run regularly on the train ;
- (d) Where such through cars, etc., are attached, and also where detached ;
- (e). The number of each through car, etc. (all vehicles of every description has its own number, and no two vehicles or locos bear the same number);
- (f) The numbers of the coaches and brake-vans forming the actual train ;
- (g) The number of the goods brake used on the train (in case of goods trains);
- (h) The number or numbers of the locos which have to haul the train, and in the case of relays of locos it states exactly what part of the journey each loco covers.
- (i) How the train must be marshalled when starting ;
- (j). Whether through cars are to be attached at the front or the rear of the train, with a view to ready disposal when detaching same.
- (k) General Notes.—This is for noting any other details affecting all or part of the train. For instance, a through car from London to Whitehaven might be noted to be placed in a certain siding on arrival at Leeds, or another note might be, "On arrival at Derby the loco must run round the triangle so as to be ready to work such-and-such a train in the opposite direction.

These cards are properly printed (see Fig. 2) with proper spaces clearly marked for the different items, and after being properly filled in, are marked to correspond with the train number, and placed in a box in correct numerical sequence.

The method of using the cards is to take the first card (*i.e.*, No. 1), marshal the train according to the instructions given on the card, using any available loco, hang the necessary destination boards on the different coaches ; then

the particular engine mentioned on the card is brought along and coupled to the train, and away it goes. After the train's run is completed, the card is again placed in the box, but at the back instead of the front. Card No. 2 is dealt with in the same way, the result being that the cards always come to the front in the proper sequence. All the different classes of trains are dealt with such as—

|                              |                               |
|------------------------------|-------------------------------|
| Express passenger. "         | Class B goods                 |
| " " with dining cars.        | Stopping "                    |
| " " with sleeping cars.      | Through " London to Carlisle. |
| Intermediate passenger.      | Meat Specials.                |
| Slow passenger.              | Cattle "                      |
| Empty coaching-stock trains. | Mineral.                      |
| Class A goods.               |                               |

Now to give some idea of how I work the goods traffic. At first I was faced with the difficulty of finding something suitable to act as merchandise, but after looking about for a little while I came across a box of stone bricks, such as are used by children, which seemed to solve the difficulty, and I have used them ever since. I also use spar, broken very small, and find it answers splendidly. Now to show how I bring them into use. I place a number of bricks at the chief stations, and here and there a heap of the spar. Next I referred to an old "Bradshaw," and with a considerable amount of patience, cut out some 3,000 or 4,000 names picked from different parts of the book. These names I put in a small box and thoroughly mixed together; then I proceeded to draw a few of them out and stuck them one by one on the bricks, dealing first with the bricks at one station, then passing on and doing the same at another station, until the whole of the bricks were labelled, the result being that the bricks were labelled without discrimination to all parts of the country. Then, whatever wagons were available at each station were loaded, care being taken that goods for one direction were put into different wagons to goods that had to travel in the opposite direction, and when possible, making up through loads. The spar was loaded into mineral wagons, the wagon itself being labelled. Before loading the wagons I had, by reference to a "Bradshaw," to find out where the various stations were actually situated, and then the goods were loaded to the best point for transhipment or otherwise, and I may mention incidentally that this procedure has given me a splendid knowledge of the country, both as regards the disposition of towns, and also as to the ramifications of the different railway companies' lines.

Now, presuming we have been dealing with goods at Edinburgh Station, we will see what happens. In the first place the various wagons are marshalled for easy disposal; then perhaps the first goods train to leave will be a stopping goods, therefore it will only take wagons for the places at which it calls. Later, a North British fast goods train for Carlisle is due to leave; this train will carry goods for Carlisle and England generally. A North British brake is of course used on this train. On arrival at Carlisle, the train is shunted into the sidings, where all goods except those composing through loads are transhipped in Midland or G. & S.W. wagons according to destination, afterwards being hauled forward by convenient trains, until finally arriving at destination, or nearest point. Each company's line is equipped with its own wagons, brakes, etc., so that a practically constant supply of wagons is available at the various transshipping points. When a piece arrives at destination, it is re-labelled, and again dealt with in the same way.

No. 151.

## WORKING ARRANGEMENTS.

*Express Passenger* **TRAIN** 8 a.m. *up*.**From** *Sheffield***To** *Bristol* 12-4 p.m.

**Calling at** *Dore and Totley, Chesterfield, Derby arr : 8-54 dep : 9, Repton, Burton arr : 9-18 dep : 9-22 ; Tamworth, Birmingham, arr : 10-8 dep : 10-15 ; Bromsgrove, Droitwich, Worcester, Cheltenham, and Gloucester, dep : 11-50.*

**THROUGH CARRIAGES.**

| Brake No. | Coach No. | From     | To       | Attached  | Detached |
|-----------|-----------|----------|----------|-----------|----------|
| (6)       | 5         | Heysham. | Bristol. | Burton F. | Through. |

**Composition of Through Train :****Coach No.** 107 **Brake No.** III**Engine No.** 64 *to Derby ; No. 32 forward.***Starting Station** MUST MARSHALL AS FOLLOWS :

(R—AT REAR ; F—AT FRONT.)

**NOTES.**

*Waits at Derby until after the running of 8-45 a.m. goods Carlisle to Langwathby, then runs through.*

FIG. 2.—TYPICAL TRAIN CARD DULY FILLED UP.  
(Italics show portions written in. The rest is printed.)

Special goods trains are run in exceptional cases, such as blocking of sidings, etc. The time-table is so arranged that the necessary engines, brakes, etc., are always ready at the point where required.

In the construction of the permanent way there are—

|                       |                            |
|-----------------------|----------------------------|
| 2 double crossovers.  | 38 left-hand points.       |
| 2 three-way points.   | 6 two-way circular points. |
| 26 right-hand points. |                            |

On the opposite page is a specimen sheet from the actual time-table and stock-book which I use, from which you will see how thorough is the method used. This book contains full details of, and gives numbers of, all my rolling stock, etc.

There are many items of detail in connection with efficient working, etc., with which it is impossible to deal fully in this article, but if any reader will communicate with me I shall be delighted to reply and give full particulars.

Please note: there is no timetable yet arranged for the Belfast and Northern Counties Railway, as I have only just recently laid this portion down, in fact it is not yet completed. I intend equipping this portion as far as possible in a thoroughly up-to-date style.

I send a rough plan (not to scale) of the main (English and Scotch) system, and also a separate plan of the Irish system, showing it as it is at the time of writing, in its incomplete state (see last issue).

I also send one or two copies of the train-working cards which I use. I find that a model railway system based on the lines on which I have worked is, to my mind, considerably more interesting than the usual kind of model railway, as it approximates much more closely to that of the actual railways, and is always providing fresh features to interest and to overcome.

I have derived great assistance from the actual railway companies' private working time-tables and the books of instructions they issue to their own servants. It is rather difficult to get hold of these books, but a little exercise of tact and persistence has generally secured what I wanted.

The destination boards which I use are made of tin, to hook on the coaches and wagons, are painted black, with the necessary names cut from the tops of time-tables pasted on.



## MINIATURE RAILWAY DEVELOPMENTS.

We announced in our last issue that negotiations were taking place to obtain a suitable site for a miniature railway in the North of England. It will interest our readers to know that this site has been secured at Halifax. Those who live in or near the city will know that the Zoological Gardens and Pleasure Grounds has recently been opened at Chevinedge, and is rapidly gaining in popularity as a resort. The Miniature Railway Co. have obtained a running concession in these grounds. The Managing Director and Mr. H. A. Bassett-Lowke recently visited the site and surveyed the ground, and decided that the most suitable position for the railway would be round the new Exhibition Ground. This will give a length of run of about 1,700 feet, and will pass through cuttings and tunnels, and round the edge of a ravine. We are promised details and photographs for our next issue, as it is hoped to have the railway running by Easter.



## DERBY and LEICESTER.

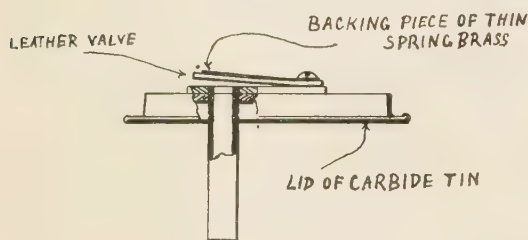
| UP.                             | Gds.<br>p.m. | a.m. | Pass.<br>a.m. | Pass.<br>a.m. | Pass.<br>a.m.             | Pass.<br>p.m. | Pass.<br>p.m. | Pass.<br>p.m. | Gds.<br>p.m. | Pass.<br>p.m. | Fish.<br>p.m. | NOTES.                                              |
|---------------------------------|--------------|------|---------------|---------------|---------------------------|---------------|---------------|---------------|--------------|---------------|---------------|-----------------------------------------------------|
| Blackburn ..                    | ..           | ..   | ..            | 8.45          | ..                        | ..            | ..            | ..            | ..           | ..            | ..            | A—Conveys traffic.<br>for London and<br>South only. |
| Manchester ..                   | 7.35         | ..   | ..            | 10.15         | ..                        | ..            | ..            | 4.15          | 4.30         | ..            | ..            |                                                     |
| Liverpool ..                    | ..           | ..   | ..            | 9.20          | ..                        | ..            | ..            | ..            | ..           | ..            | ..            | B—VICTORIA.                                         |
| Chinley .....                   | ..           | ..   | ..            | 11.46         | ..                        | ..            | ..            | ..            | C            | ..            | ..            | O—Via Chaddesden.                                   |
| DERBY .....                     | ..           | ..   | ..            | 0             | ..                        | 12.18         | 2.15          | ..            | 8.13         | ..            | ..            | S—Stourton Sidings.                                 |
| Spondon .....                   | ..           | ..   | ..            | ..            | ..                        | 12.24         | ..            | ..            | ..           | ..            | ..            | G—Goods Station.                                    |
| Borrowash .....                 | ..           | ..   | ..            | ..            | ..                        | 12.28         | ..            | ..            | ..           | ..            | ..            | C—Chaddesden.                                       |
| Draycott .....                  | ..           | ..   | ..            | ..            | ..                        | 12.34         | ..            | ..            | ..           | ..            | ..            | W—Stops for Water.                                  |
| Sawley .....                    | ..           | ..   | ..            | ..            | ..                        | 12.37         | ..            | ..            | ..           | ..            | ..            | *—Shunts.                                           |
| Sawley Junction ..              | ..           | ..   | ..            | ..            | ..                        | 12.41         | ..            | ..            | ..           | ..            | ..            | R—Stops if required.                                |
| Leeds .....                     | 1.35         | ..   | 8.10          | ..            | 10-15                     | ..            | ..            | 4.0           | ..           | 7.17          | 8.10          | Jc—Junction.                                        |
| York .....                      | ..           | ..   | ..            | ..            | ..                        | ..            | ..            | ..            | ..           | ..            | ..            | D—Brunswick.                                        |
| Sheffield .....                 | ..           | ..   | 9.1           | ..            | 11.10                     | ..            | ..            | 4.47          | ..           | ..            | 10.25         | E—Queen's Road.                                     |
| Chesterfield ..                 | ..           | ..   | ..            | ..            | ..                        | ..            | ..            | ..            | ..           | ..            | ..            | H—Somers Town.                                      |
| Trent .....                     | ..           | ..   | ..            | ..            | 11-55 a.m. ex Nottingham. | ..            | ..            | ..            | ..           | ..            | ..            |                                                     |
| Kegworth .....                  | ..           | ..   | ..            | ..            | 12.8                      | 12.45         | ..            | ..            | ..           | 8.52          | 11.38         |                                                     |
| Hathern .....                   | ..           | ..   | ..            | ..            | ..                        | 12.53         | ..            | 5.45          | ..           | 8.55          | ..            |                                                     |
| LOUGHBORO' ..                   | ..           | ..   | ..            | ..            | ..                        | 1.0           | ..            | ..            | ..           | ..            | ..            |                                                     |
| Barrow-on-Soar,<br>and Quorn .. | ..           | ..   | ..            | ..            | ..                        | 1.5           | ..            | ..            | ..           | ..            | ..            |                                                     |
| Sibley .....                    | ..           | ..   | ..            | ..            | ..                        | 1.12          | ..            | ..            | ..           | ..            | ..            |                                                     |
| SYSTON .....                    | ..           | ..   | ..            | ..            | ..                        | 1.17          | ..            | ..            | ..           | ..            | ..            |                                                     |
| Humberstone Rd.                 | ..           | ..   | ..            | ..            | ..                        | 1.23          | ..            | ..            | ..           | ..            | ..            |                                                     |
| LEICESTER .....                 | ..           | 4.0  | ..            | ..            | ..                        | 1.30          | ..            | ..            | ..           | ..            | ..            |                                                     |
| Nottingham ..                   | 1.9          | 4.10 | 10.12         | 12.7          | 12.24                     | 1.38          | ..            | 6.0           | ..           | 9.19          | 12.16         |                                                     |
| Kettering .....                 | ..           | ..   | ..            | ..            | ..                        | ..            | 2.43          | ..            | *W           | ..            | 12.22         |                                                     |
| Bedford .....                   | W.           | ..   | ..            | ..            | ..                        | ..            | ..            | ..            | ..           | ..            | ..            |                                                     |
| Hendon .....                    | 2.35         | ..   | ..            | ..            | ..                        | ..            | ..            | ..            | 10.29        | ..            | 1.58          |                                                     |
| Brent Sidings ..                | G            | G    | ..            | ..            | 2.20                      | ..            | ..            | ..            | 10.36        | ..            | 2.2           |                                                     |
| London .....                    | 4.5          | 6.20 | 7.20          | 12.2          | 1.35                      | 2.15          | ..            | 7.50          | 11.45        | 11.15         | 3.40          |                                                     |

## STEAM-RAISING DEVICE FOR MODEL LOCOMOTIVES BURNING SOLID FUEL.

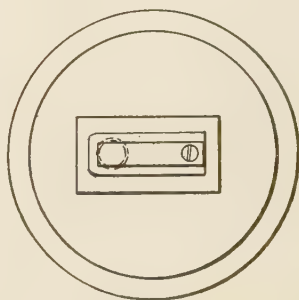
BY W. G. ROBLIN.

THE following is a description of a very simple and inexpensive apparatus by which a steady and continuous draught can be obtained for raising steam in model locomotives, etc. The apparatus here described is used in conjunction with an extension chimney to that on the model, and was rigged up as an experiment, fully justifying expectations as a steam raiser. To those already in possession of a cycle pump the outlay is practically nil as compared with the purchase of a foot-bellow for the same purpose.

A stout tin with lid is first obtained, preferably one of the air-tight variety. An empty carbide tin serves excellently, as the lids of these fit very close. If not to hand, one can no doubt be easily obtained from a cycling friend.



*Section.*



*Plan.*

FIG. I.—ARRANGEMENT OF NON-RETURN AIR VALVE IN THE LID OF RESERVOIR.

A minute description of this container is hardly necessary, as the sketches show clearly the idea, but it will be seen that a piece of  $\frac{3}{32}$ " or  $\frac{1}{8}$ " flat brass is soldered on to the inside of the lid with a piece of  $\frac{1}{4}$ " brass tube through it towards one end. The tube on the inside of the lid is filed off flush with the piece of brass forming a face on which the valve acts. The valve itself consists of a piece of thin leather about  $\frac{1}{16}$ " or  $\frac{3}{32}$ " thick, and is backed with a piece of thin springy brass. It should be secured in position by a screw  $\frac{1}{8}$ " or  $\frac{3}{32}$ " as shown in sketch. Do not place the screw too near the tube hole or the valve will have short leverage and be very stiff to raise, about  $\frac{5}{8}$ " from centre of tube would be a suitable distance.

Attention is now transferred to the bottom of carbide tin. Into this should be soldered a piece of brass or copper tube about 2" long, and having a bore of not more than  $\frac{3}{32}$ ". This is for the outlet, and is connected up to the nozzle in extension chimney by a suitable length of rubber tube. Assuming that an extension chimney is not already in use, it is necessary to procure a piece of cycle or other tube which will fit the chimney bore of model, and of a length of about 18". At a distance of 3" or 4" from the base a nozzle is fixed with a small opening pointing directly up the centre of chimney. The best method of doing this is to drill and tap a  $\frac{1}{4}$ " hole at the correct

position in chimney, and screw a short length of tube to suit this. Bush the screwed end of this piece of tube to take a short length of  $\frac{1}{8}$ " out dia. brass or copper tube. This should be bent at right-angles to the tube into which it is bushed, and of such a length that when slipped through the screwed hole in side of chimney it will revolve, and so admit of the larger tube screwing home. The outlet inside chimney should be contracted to  $\frac{1}{32}$ " or less, and this in turn can be bushed if necessary to obtain a sufficiently small opening in nozzle.

The lid of carbide tin should now be fixed in place; a thin packing of paper round the rim will assist to make it air-tight. This end is now connected

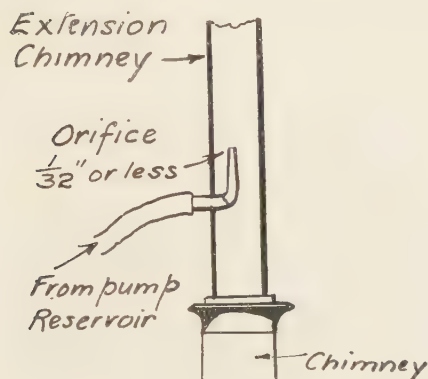


FIG 2.—EXTENSION OF CHIMNEY AND NOZZLE.

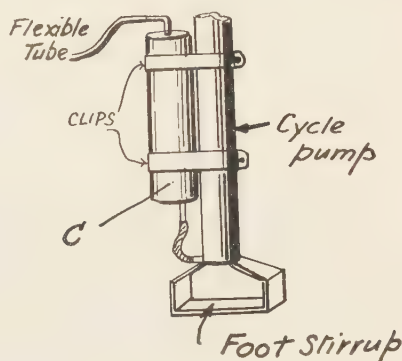


FIG. 3. METHOD OF CLIPPING THE RESERVOIR (CARBIDE TIN, C) TO FOOT PUMP.

to cycle pump, and at other end the smaller outlet pipe is coupled up by tube with the nozzle in chimney, and if a fair amount of care has been taken a strong and steady draught will be maintained in chimney. Should a foot cycle pump be available the whole arrangement can be made very compact by clipping the carbide tin alongside the pump barrel as shown in Fig 3, the narrow diameter of carbide tin assisting to this end.



### FURNESS RAILWAY.

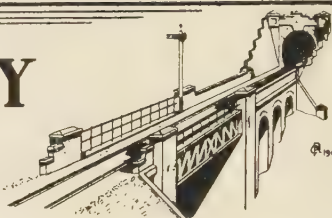
THE Furness Railway are replacing the boards indicating the number of miles per hour to which speed is limited by a disc showing the 25, 15, or whatever the limit is, in white figures by day which can be illuminated by night.—*Railway Notes.*



### NORTH STAFFORDSHIRE RAILWAY.

THE above line is discontinuing the practice of numbering its engines in brass figures, which was only introduced a few years ago, and is substituting painted numbers in shaded gold.—*Railway Notes.*

# MODEL RAILWAY ENGINEERING.



## A COMPLETE No. 1 GAUGE MODEL RAILWAY STATION.

THE advent of the "Lowko" track and the materialisation of various scale model accessories for model railway stations which the writer has described in the last few issues of our journal, has made it possible to produce a really complete model station within reasonable limits of space. Although perhaps the lay-out of the special set-piece to be seen at Messrs. Bassett-Lowke's new showrooms does not in the least represent finality in model railway design,



DETAIL VIEW OF RIGHT-HAND END OF No. 1 GAUGE MODEL RAILWAY STATION, SHOWING CLOCKWORK G.N.R. LOCO ON THE DOWN MAIN LINE.

it will, it is submitted, give our amateur readers much to think upon. We get from time to time plans of various proposed schemes for model lines which are complicated in the extreme, and we think that the senders hardly realise the amount of work involved in their suggestions, that is, if they are worked out to their proper conclusion.

The plan of the railway station illustrated herewith is fairly simple, but we think that all readers will agree that it makes up into a sufficiently interesting centre-piece, which could be made to form part of a very good indoor railway by extending the main line in each direction to meet at the other side of the room, and adding to the length of the goods road on the left. In the latter case the goods shed could be moved a little further along. However, considering that the large "Lowko" standard curves are employed



for the main lines, it is rather surprising that in the model illustrated herewith it has been possible to get so much within the relatively small space of  $9' \times 3'$ .

The engine shed is exactly the same as that described in our last two issues, and is built to take one standard express loco and tender or two tank engines.

The goods shed is a new No. 1 gauge building. It is typical of a small country station, and has a floor or "bank" about the same height as a passenger platform and sliding doors next the rails. Where both sides of the shed are seen it is advisable to duplicate the sliding doors next the roadway, but in this instance this was of course unnecessary. The awning is standard



DETAIL PHOTOGRAPH OF NO. 1 GAUGE MODEL GOODS SHED.

(The rails in the foreground is the new "Lowko" track).

with the station awning, but does not project so far from the face of the building. It is placed with the lower edge of the notched fascia board  $4\frac{3}{4}$  inches above rail level, and projects  $2\frac{1}{2}$  inches from the building. The pitch of the roof is 30 degrees, and the dimensions of the building are 11" long  $\times$   $6\frac{1}{4}$ " wide. The platform projects 1" in front of the building. The eaves are 5" above rail level, and the top of the ridge board 8".

A window is arranged in the end wall facing the passenger station: this in an actual building would be used to light the checker's office. A small crane may be fitted on the wall next the rails or inside the building as desired.

The cattle pen is 12" long  $\times$  4" wide, and is  $1\frac{3}{4}$ " above ground level. The fences are 2" high, and have a top rail of wood, and four wire rails in between this and the floor. The gates are made out of the standard palings, and are hung on model hinges made of split pins. The ramp leading up to the cattle pen is 5" long and  $3\frac{1}{4}$ " wide.

The platelayers' huts are standard No. 1 gauge size; the coal office is a new model, and has a sign or name-board fitted to the ridge of the roof.



BIRD'S-EYE VIEW OF CENTRE PORTION OF NO. 1 GAUGE EXHIBITION MODEL STATION.

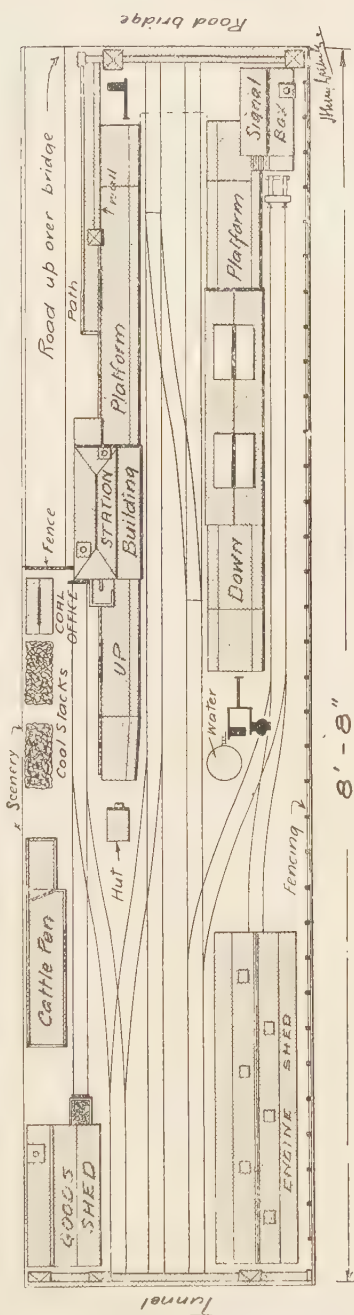
Scale  $\frac{3}{8}$ " to the foot; gauge  $1\frac{3}{4}$ "; length over all 8' 8".

The model comprises passenger station with main buildings, island platform and awning, roadway at back leading from goods yard to bridge over the line, engine house, goods shed, cattle pen, coal stacks, coal office, platelayer's hut, water tower, signals and signalbox.

MADE FOR MESSRS. BASSETT-LOWKE'S SHOWROOMS at High Holborn, to designs by Mr. Henry Greenly.



GENERAL VIEW OF MODEL FOR MESSRS. BASSETT-LOWKE'S LONDON SHOWROOMS.



"PLAN OF NO. 1 GAUGE MODEL RAILWAY STATION LAY-OUT.



Because of the simplicity of the name it is lettered "Wood & Co," the name of the well-known coal merchants. To add to the realism of this feature of the set-piece two stacks of coal are arranged alongside the office building. These are  $5\frac{1}{4}$ " long  $\times$   $3\frac{1}{4}$ " wide, and are made upon an inner structure of wood. The coal, which is actual coal, is duly whitewashed along the top edge. A piece of standard fencing cuts off the public road from the goods yard.

The station buildings are made to the designs contained in our November and December issues, and behind the main building on the "up" platform a roadway is formed inclining up to the over-bridge which crosses the line at the right-hand end of the station. In the set-piece model the face of the road bridge only is used, fixed to a vertical board which terminates the model. At the other end a tunnel face gives a finish to the piece, but both of these are readily removable should the station lay-out be required to form part of a longer model railway system.

To give an external finish to the public roadway a fence is placed along the station edge of the footpath and a small earth-coloured bank arranged to slope down to a retaining wall which skirts the back edge of the platform, and on which are placed specially-made No. 1 gauge model advertisement plates.

On the longer (2' length) of "up" platform only a portion is therefore fenced with the standard aluminium fencing, a part of which is hinged to form a side entrance gate from the public roadway.

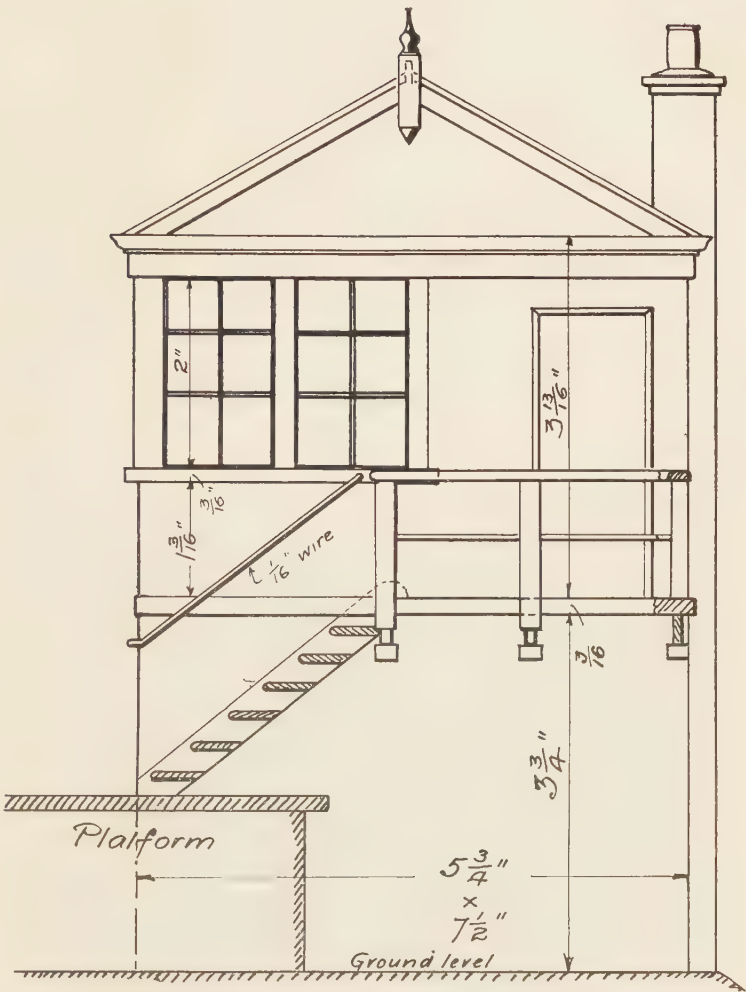
The island platform has a standard awning (see December issue, page 392, fitted with four top lights of ground glass. The signalbox was built to the sketch reproduced herewith, and has a stairway leading down to the island platform. The levers of the points are worked from the lower floor of the box, and as at the present time no other are available they are the standard tin-plate point levers minus the point lamps, connected by bell cranks to the respective points. The two crossover points, the bay road to main line and bay road to engine shed points are actuated from the signalbox. Since the photographs were taken the signals and water tower have been fixed in accordance with the plan reproduced on page 81 herewith.

The background is a piece of oil-painted scenery typical of "Old England." This certainly gives it a realistic finish. Where such scenery is fitted to a model railway it should, if there is room, be placed a few inches away from back of any buildings—the farther the better so long as the bottom edge is not revealed—and if possible the ground should be arranged to have edge rounded off to the back so that a "horizon" is formed to the eye of the spectator. Where a hand-painted scene cannot be aspired to the writer suggests the use of a deep wall-paper frieze, many designs of which can be obtained representing country scenery.

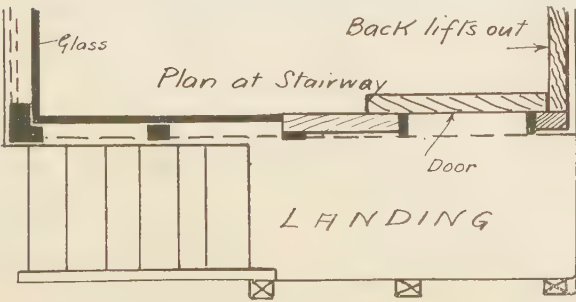
At the right end of the platforms a sleeper road is formed crossing the rails. This gives a finish, and at the same time allows the point-rods from the signalbox to be covered over in a proper manner. The station staff shown is one of Messrs. Hull & Son's larger boxes, and the seats, time-table boards are the same as those illustrated in our sixpenny handbook. The donkey shown going up the hill in our first picture is taken from one of the battery sets of model artillery soldiers.







END ELEVATION OF NO. 1 GAUGE SIGNALBOX.



PLAN OF STAIRWAY  
END.

(Drawings Half-full  
size.)

**PETROL RAIL MOTOR INSPECTION CAR,  
NORTH-EASTERN RAILWAY.**

READERS of *Model Railways* will remember a novelty described in the September and October issues last of this journal—the 4-4-4 type tank locomotive built for Mr. Bartholomew, of Blakesley Hall, Northants—which was designed and constructed with an ordinary “steam” outline, but derived its motive power from a petrol motor arranged between the side tanks. We recently had the pleasure of inspecting at York Carriage Shops a further development of this idea in the shape of a neat and handy inspection car constructed by the North-Eastern Railway Company for the purposes



FIG. 1.—PHOTOGRAPH OF OFFICER'S PETROL RAIL MOTOR CAR,  
NORTH-EASTERN RAILWAY.

of line inspection by its officers. By the courtesy of Mr. Wilson Worsdell, the locomotive superintendent of that line, we are enabled to reproduce a photograph of the car and to print the descriptive particulars herewith.

The car is 17' in length by 7' in width, with a wheelbase of 10'. It is arranged with a driver's compartment at each end, and with an open saloon 10' long in the middle. The saloon is entered through either of the driver's compartments, and there is a permanent seating accommodation for six passengers,

whilst two extra seats are provided on camp stools. The ends and roof are shaped so as to offer as little resistance as possible to the wind. Motive power is provided by a 35-40 h.p. four-cylinder petrol engine, with cylinders  $4\frac{3}{8}$ " diameter by  $5\frac{1}{2}$ " stroke, the normal speed of running being 950 revolutions per minute. The inlet and exhaust valves, which are placed on opposite sides of the engine, are mechanically operated. An ordinary centrifugal type governor is attached to the exhaust cam shaft. Duplicate ignition is provided, namely, Eisemann's high-tension and ordinary low-tension. The carburetter is of the Krebb type, gravity fed. The cylinders and main bearings of the engine are lubricated by a "Dubrulle" lubricator fixed in the driver's compartment and driven from the engine by a small countershaft. The engine can be controlled from either end of the car.

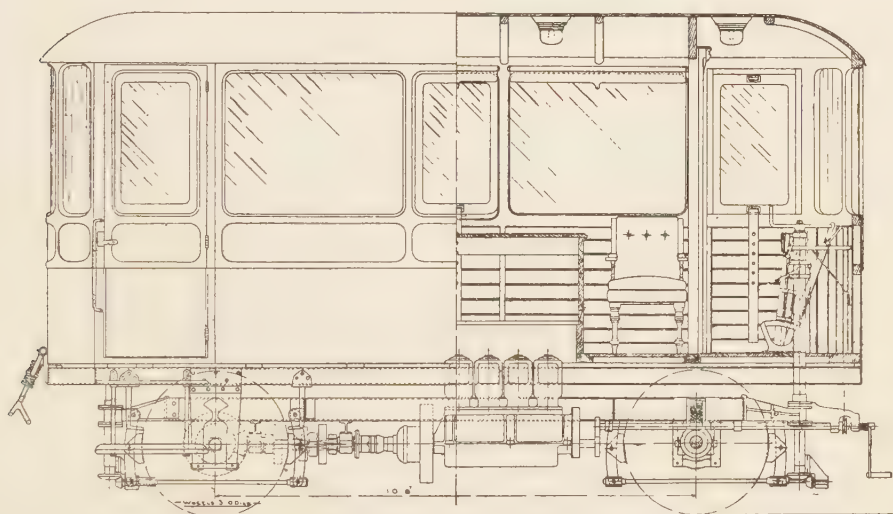


FIG. 2.—SECTIONAL ELEVATION OF N.E.R. RAIL MOTOR CAR.

The motor is mounted on an independent frame built up of light steel channels, and is carried on inside journals on the axle by means of roller bearings. The journals are 3" diameter by  $4\frac{3}{4}$ ", and at  $2' 8\frac{3}{4}"$  centres. The centre line of the engine shaft is also the centre line of the driving axle. The driving wheels have no springs between the axleboxes and the frame, but at the trailing end helical springs are interposed between the trailing axleboxes and the frame, but at the trailing end helical springs are interposed between the trailing axleboxes and the frame. These boxes work in hornplates with a radius described by the wheel base, and take off a considerable amount of shock between the rails and the engine frame. The gears, fitted with rigid shafts, are fixed to the underframe and carried in gunmetal bearings, and they give three speeds in either direction, that is, slow speed, 15 miles per hour; medium speed, 30 miles per hour; and fast speed, 45 miles per hour—the last-mentioned being direct from the engine to the bevel gears on the driving wheels. The rotary motion is applied to the driving wheels by a pinion fixed to the end of the engine shaft and arranged to gear with either of the two large bevels

fitted on a sliding sleeve on the driving axle. The centre part of the axle is of square section to receive the sleeve and bevels, which give the forward and reverse movements, and are operated from the driver's compartment by a horizontal reversing screw, the thrust necessary to keep the bevels up to the pinion being taken by a double ball bearing. A "Hele-Shaw" clutch is used between the engine and its work, operated by hand levers placed in a convenient position in the driver's compartment. The gears are also operated in a similar manner.

The body frame is built up of light channels and angles, and is carried on roller bearings with journals  $2\frac{1}{2}$ " diameter by 5" placed outside the wheels, and is therefore quite isolated from the engine frame, so that any vibration set up by the engine or gears cannot be communicated to the car. Two water tanks, each holding seven gallons, are built into the framing, and these, whilst giving a certain amount of steadiness to the body, form the water supply for the engine, and a system of radiating pipes is fitted between the latter and the tanks. The four wheels of the car are of the Mansell type (wood centres), 3' diameter, and of the ordinary North-Eastern Railway standard so far as the tread and flange are concerned. A hand brake of exceptionally powerful design, operating four blocks on each pair of wheels, is placed in the driver's compartments at each end of the car, whilst warning

and other signals are given by a loud horn coupled to the engine exhaust and operated from either end of the car, where also sand can be applied to the rail when travelling in either direction. The body is built of teak with mahogany panels, the interior being finished in walnut. Above the waist rail a clear outlook is obtained in every direction for inspection purposes, single pillars only having been used to carry the glass of which the sides and ends are chiefly composed. A table is placed in the middle of the saloon, the lower part of which gives access to the top of the engine, whilst suitable trap doors in the floor give access to other parts of the gear. Electric

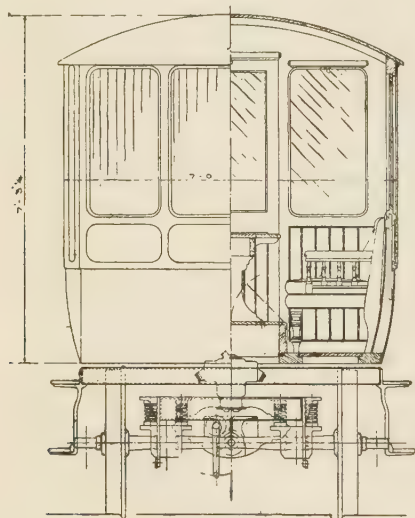


FIG. 3.—END VIEW N.E.R. RAIL MOTOR CAR.

light on the storage principle is fitted and a speed indicator is placed in the driver's compartment. Externally, the carriage is finished in the usual North-Eastern style. In running order the car weighs 6 tons 12 cwt., and carries 15 gallons of water and 20 gallons of petrol. The consumption of petrol averages one gallon to 12 miles, so that the capacity of the tank is equivalent to a journey of 240 miles. The car should make an excellent prototype for an electrically-driven model, which could be used on a model line to run "engineers' specials" at intervals between the other trains.



## A 1 $\frac{1}{4}$ " GAUGE MODEL MINERAL RAILWAY.

BY H. A. TURNER.

THE following is an account of a model railway in the smallest gauge, and built up at little expense, which may perhaps be of interest. To begin with, there are no sleepers, the rails, tin lengths, being pinned down direct to any odd piece of wood at hand, and ballasted with varnish and sand, so that the absence of sleepers is not noticeable. As circular systems are not in favour

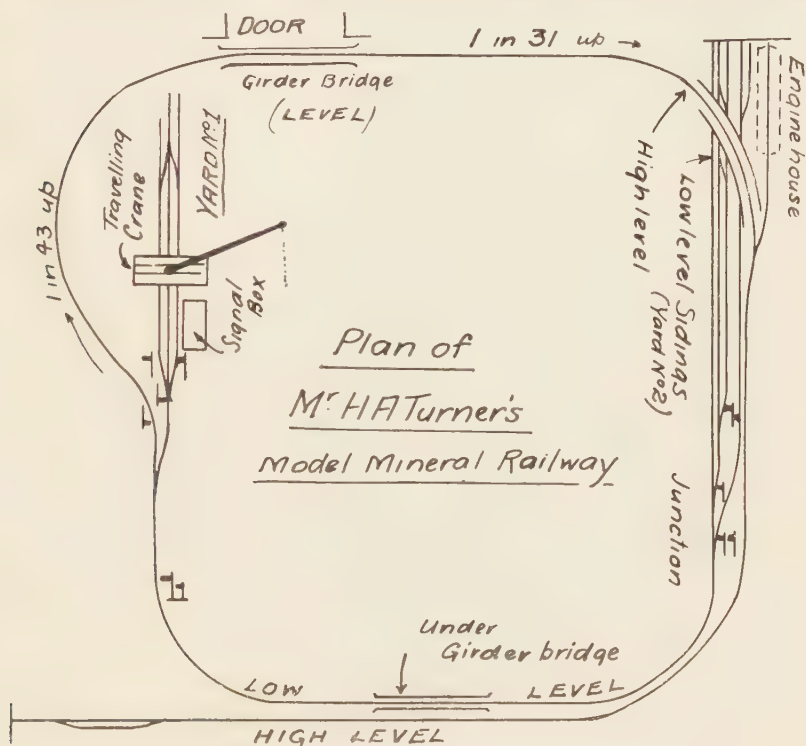


FIG. 1.—PLAN OF LINE.

with the "manager," an attempt has been made to get a fairly long run for the excellent clockwork "Peckett" locomotive by gradually running from a higher level, and thus continuing nearly twice round the room. There is no pretence at scenery, but there are two girder bridges: scenery may come later. All points are home-made, and were rather difficult to make to work in tin-rail. Both kinds are in use, the ordinary tin-rail switch, and the correct pattern with wing rail, frog, etc., but owing to the large clearances necessary for wheel flanges, the latter type are unsuitable for fast running.

There are no stations, the line being intended to be a mineral one, consequently nearly all the wagons are of the side-tipping variety, as the "manager's" little girls like to fill the wagons with rice at the top level terminus, and tip it at one of the two yards at the other end. There are two shunting yards—one the terminus of the main line, and the other just past the junction of the main line at the beginning of the ascent to the higher level. This junction is protected by signals worked from a cabin in this yard, and also the points, the bell-cranks of which have to be covered in,



FIG. 2.—VIEW FROM THE  
CRANE.

*(Loco and brake descending  
1 in 43 gradient.)*



FIG. 3.—VIEW OF LOW-  
LEVEL MARSHALLING YARD  
(NO. 2) AND HIGH-LEVEL  
ROAD AND ENGINE  
HOUSE.

as they are naturally much out of scale. This yard is fitted with an over-head crane travelling on a gantry, by which some of the hopper wagons are slung over what is intended to be a quayside, and discharged through the bottom. This necessitates a train composed of both side-tip and hopper wagons being split up at the junction for their respective destinations.

The signals in No. 1 yard are really only point indicators, and work with them, one on, one off. The gradients are stiff—1 in 43 for 9 feet (= 432 feet at the scale of 1" = 4 feet), then a short piece of level across a three-girder bridge, then another 432 feet of 1 in 31. The clockwork locomotive will take up this five empty tip wagons, or four and a van, which speaks well for

the capacity of the engine, considering that the ascent begins with an S curve and continues all the way on a curve till the bridge is reached, when a short piece of straight intervenes, concluding with another long curve.

The stock is composed of—

1 "Peckett" clockwork loco.

1 four-wheeled dummy engine (for the children to push), but which can be easily fitted with clockwork mechanism.

1 steam S.E. & C.R. autocar, with the initialling painted out. (This is not in much favour, as it will not reverse.)

1 home-made bogie carriage with centre vestibule to run as an autocar train.

1 home-made goods brake van.

1 cattle van (home-made).

2 bogie wagons (1 home-made).

1 end tipping wagon „

2 hopper wagons.

1 high-sided wagon „

10 side-tip wagons (1 home-made).

1 low-sided wagon.

All home-made vehicles have doors to open either side. The whole thing is a source of endless amusement and pleasure. The points of the

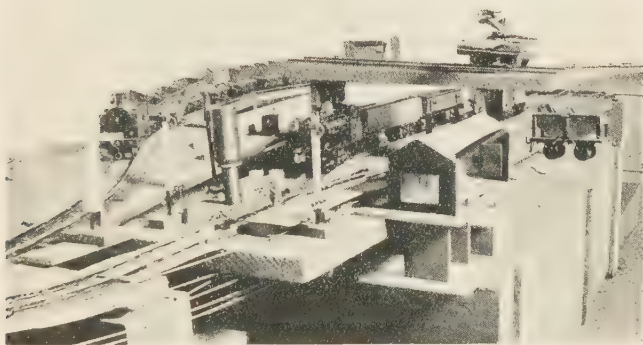


FIG. 4.—SHUNTING YARD NO. 1 AND TRAVELLING CRANE.

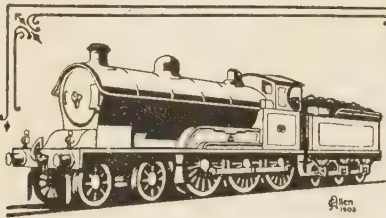
junction work fully three feet from the lever in the signalbox, which the "manager" has not seen hitherto done in 1 $\frac{1}{4}$ " gauge model systems.

What the "manager" is waiting for now is a steam loco for the 1 $\frac{1}{4}$ " gauge which shall be correct, at any rate externally, and shall reverse: none other need apply.\*

The views will show to some extent the nature of the two yards, all that it was possible to photograph. The total length of main line is equivalent to about three-quarters of a mile, and total rail, sidings, etc, is about 1 $\frac{1}{4}$  miles.

[\*Coming in due course.—EDITORS.]

WE beg to remind our readers of the "Glosso" series of postcards of Caledonian Railway locomotives which can be obtained from the General Superintendent, Dept. 17, Caledonian Railway, Buchanan Street, Glasgow, in packets of six for 4d. post free. The new Model Clockwork Locomotives "Cardean" and the West Coast Joint Carriages have proved a great success. Readers should therefore order before the stock is exhausted.



# MODEL LOCOMOTIVE CONSTRUCTION

## DESIGN FOR $3\frac{1}{4}$ " GAUGE MODEL L.N.W.R. "PRECURSOR."

(Continued from page 50.)

THE slide bars as mentioned in the last article are of  $\frac{5}{32}$ "  $\times$   $\frac{1}{8}$ " section steel shouldered down to  $\frac{3}{32}$ " diameter circular spigots at each end: they should be  $\frac{3}{8}$ " long between the spigots. The fixing into the back cylinder cover is shown in the accompanying full-size drawing.

The crosshead can be made either separately or in one piece with the slipper blocks. In the latter case the gudgeon pin must be a plain pin throughout its length, and to fix the same a  $\frac{1}{32}$ " steel pin may be driven through it at one of the forks of the crosshead, say at A in the drawing Fig. 8. With separate slippers a shouldered pin may be used,  $\frac{5}{32}$ " for the little end journal and  $\frac{7}{32}$ " in the slide blocks. The piston-rod is secured to the crosshead by

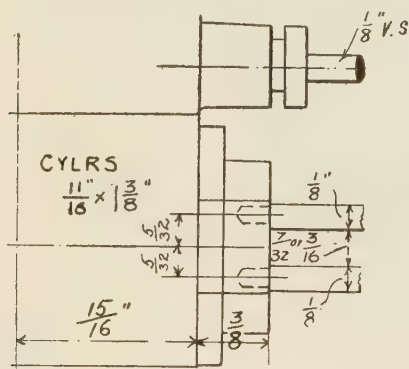


FIG. 7.—FIXING SLIDE BARS TO  
CYLINDER COVERS.

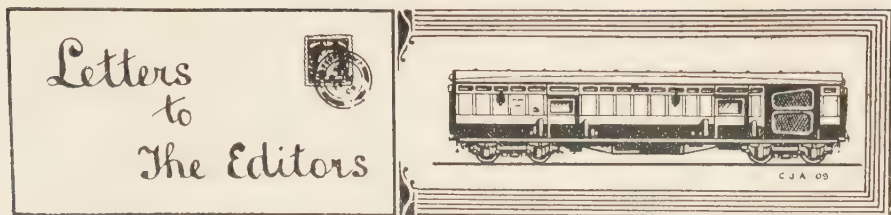
a pin, the hole for the rod being a tight fit and either bored "blind" as shown in the detail, or, perhaps still better, bored through and finally rimmed to size by a long rimer made to pass through a temporary front cover and the actual back cover with the crosshead and slide blocks in place. This method ensures almost absolute alignment of the parts.

The valve motion is practically full "Joy's" gear, and the details herewith are reproduced full size for the model. The motion is exactly to scale from the original, and if properly made will give a perfect distribution of steam. The only material difference in the construction of the motion is in the lap and lead portion of the vibrating link. As most model locomotive builders know, it is impossible to use the two pins employed in the prototype if a really sound working model which will withstand a fair amount of usage is desired. Here the designer has employed the method shown in his book







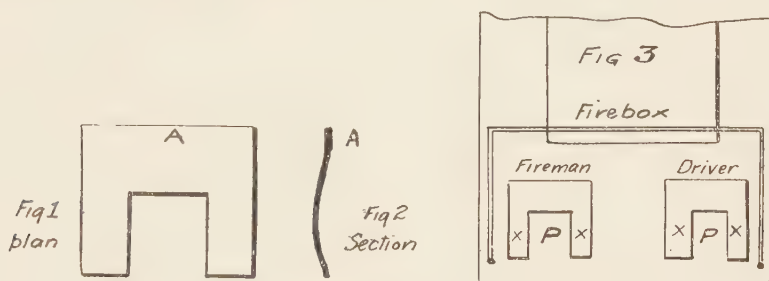


## FIXING MODEL ENGINEMEN TO LOCOMOTIVES.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

No doubt many of the owners of No. 0 and 1 gauge railways that have Messrs. Hull & Sons' station staffs for improving the appearance of their lines, have experienced a little difficulty in getting the enginemmen to keep the footplate when the engine is running : there is one way of doing it by hooking one of the arms of the men outside the cab, but it certainly does not look quite the thing for enginemmen to be hanging on the side, so I got over the difficulty by the following, which may be of use to others.



## FIXING MODEL ENGINEMEN TO LOCOMOTIVES.

Procure a piece of sheet tin or brass (if tin thick) and cut a piece out the shape of Fig. 1, and bend it to a curve similar to that marked Fig. 2 ; this should then be soldered to the footplate along the edge marked A as shown in Fig. 3. This makes a spring clip, the stand piece of the figure fitting between the clip and footplate at X, the legs coming where marked P. If the clip is painted black it will be hardly noticeable.

I can cordially recommend these sets of figures to model railwayacs who favour the small type ; they impart an air of business to the stations, and certainly give the locomotives an appearance that they have not run away.

I trust the above may be of use to some of my fellow-readers, and wish the magazine prosperous progress this year ; indeed, it should have a non-stop run with all the "sticks off."

Faithfully yours,

W. R. S. SMART.

## 4-4-2 TANK AND 4-4-0 TENDER ENGINES.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

With reference to Mr. Allen's remarks (p.4 of your January issue) as to the L. & S.W.R. Co. probably being the pioneers of the 4-4-2 type of tank

engines, may I point out that the credit for introducing this type appears to be due to the L.T. & S.R. Co. ? So far as my information goes, the latter company brought out the first of their 4-4-2 tank engines in 1880 (not in 1877, as stated by Mr. Allen), whereas the first of the corresponding type on the L. & S.W.R. did not make its appearance till 1882. Some misapprehension might arise from the fact that twelve 4-4-0 side tank engines which were built to Mr. Adams' designs by Messrs. Beyer, Peacock & Co., Ltd. in 1879, were reconstructed as ten-wheeled engines during the years 1883 to 1886, inclusive. I have noticed that these engines, as thus altered, are sometimes referred to as "built 1879," which statement, although in a sense accurate, is, of course, misleading. Of his 4-4-2 tank engines proper, Mr. Adams constructed fifty-three in all—twelve in 1882, ten in 1884, and thirty-one in 1885. All of these were supplied by outside firms. It is interesting to note that the twelve 4-4-0 tank engines were the first locomotives designed by Mr. Adams as locomotive superintendent of the L. & S.W.R.

Mr. Allen thinks that the L. & S.W.R. were one of the earliest companies in this country to adopt the 4-4-0 tender engine as a standard type for main line service. He is possibly right, as, although four-coupled bogie express engines were in use as long ago as 1860, viz., on the Stockton and Darlington Railway, it is doubtful whether they can be regarded as having been the standard type on that line, especially as four which were built between 1871 and 1874, and which were known as "Ginx's Babies," were afterwards reconstructed as six-wheeled engines. Mr. Jas. Stirling introduced the 4-4-0 type on the Glasgow & South-Western Railway in 1873; Mr. S. W. Johnson on the Great Eastern Railway in 1874, and on the Midland Railway in 1876; and in the last-mentioned year Mr. Joseph Beattie brought out the type on the L. & S.W.R. Mr. Beattie's practice was followed up by Mr. Adams, and Mr. Johnson's predilection for the type is well known. Mr. Adams, who was Mr. Johnson's successor on the Great Eastern, multiplied the 4-4-0 type on that railway, but, as we know, it was subsequently departed from until a comparatively recent period. Again, Mr. Jas. Stirling's practice was not adhered to by his successor, Mr. Hugh Smellie, although it is now followed by Mr. Jas. Manson. Hence, the L. & S.W.R. and the Midland seem to have been the first lines to make the 4-4-0 engine their standard type.

Yours faithfully,

LONDON, N., 25th Jan., 1910. ———

F. W. BREWER.

DEAR SIRS,

With reference to the statements in Mr. Allen's article *re* the L.S.W.R., I should like to state that the first ten-wheeled tank engines on this line were built by Messrs. Beyer, Peacock & Co. in 1882, of which there were twelve. They worked until recent years the London suburban traffic, but are now mostly on country branch lines. Their running numbers are 415—26. The bogie and trailing radial wheels are 3' diameter, and driving and coupled wheels 5' 7" diameter. The cylinders on the outside are 17½" diameter by 24" stroke. Boiler barrel 10' long between tube plates and 4' 2" diameter; pressure 160lbs. per sq. inch; heating surface, total 1,059.32 sq. feet; wheelbase 29' 5"; tanks, capacity 1,000 gallons and bunker 100 cubic feet; weight in working order 54 tons 2 cwt. Later, Messrs. Dübs & Co. delivered a batch, and in 1885 Messrs. Neilson & Co. built eleven more (Nos. 4779—89), all of which are at work, No. 487 having been reboilered in 1897. All these engines are similar in appearance, but differ in details.



Mr. Allen is in error with regard to the L.T. & S.R. The motive power was provided by the G.E.R. from its opening in 1854 till 1880, when it agreed to supply its own engines. Thirty-six engines, all of the 4-4-2 type, were built by outside firms from 1880 to 1892, being almost identical. Twelve more of a larger type were built in 1896 and 1898. Twenty-eight have since been built. I may mention that beyond two 0-6-0 goods tender engines and six 0-6-2 tank engines dated 1899 and 1903 there is no other type on the railway.

With hopes for the success of your excellent journal,

I am, yours faithfully,

WEST NORWOOD.

C. C. CROWTHER.

### ANSWERS TO CORRESPONDENTS.

SUBSCRIBER.—We have considered your suggestion, and will announce in a later issue the details of a competition for the best and most realistic photograph of a model railway. Readers who intend to compete will therefore be getting on with their models. They have much food for thought in the present issue.

H.L. (Stockport).—We are obliged by your letter and suggestions. You can arrange the plates satisfactorily by getting the bookbinder to paste them on linen strips. The position of blocks was unavoidable.

F.H. (Farnham).—No, the coach interiors are not made for No. 0 gauge.

J. COTTER (B'head).—We have tried several schemes for rail plan, but we cannot do justice to it unless we are furnished with the dimensions of the rooms.

B. HEATON (Manchester).—We await the photos of your railway and locos.

A. KERR (Sussex).—We do not think the L.B.S.C.R. could be considered "a great trunk line."

W. H. S. (Chellaston).—A  $\frac{5}{8} \times 1$  cylinder should be used for a single cylinder model of the M.R. 7' 0" express loco "Princess of Wales." There is no advantage in using link motion in a single-cylindere model except that to which you refer, viz., the reversing of the loco by a screw wheel from the cab. Stephenson's motion, however, can be fitted to this engine where either one or two cylinders are employed.

G. H. K. (Croydon).—Article held over.

G. M. S. (Galleywood); E. V. S. (Wandsworth).—Thanks for photos.

E. R. (Perth).—Use  $\frac{3}{16}$ " or  $\frac{7}{32}$ " wood for station buildings (see November issue). Varnish baseboard of line and throw on sand.

J. H. CORAH.—Photo of Red Hill Tunnel has been lost in post; can you replace same.

C. T. D. (Manchester).—The Caledonian models are essentially table models, and have flanged wheels solely for appearance sake. There is no reason why you should not use the body to make a model to run on rails.

"SCOTTISH ENTHUSIAST."—The demand is not great enough, but some models of Scottish Railway vehicles are, we understand, coming in due course.

H. H. W. (Wimbledon).—It depends on the rails and the lay-out of curves, etc. On the level and straight about 10 trucks is a normal load.

D. E. H. P. (Leeds).—(1) No, we cannot. (2) Yes, write them. (3) As a rule on the outer rail.

W. W. (Old Charlton).—Quite out of the question at present.

W. G. R.—We have seen the designs. We wish some writers could be original.

G. E. S. (Sheffield).—The ringed signals, L.N.W.R., are those which refer to the slow line or to lines which branch out from the main.

"R. H. and T. G. F. W."—The reader who took the photo of the Cambrian loco (page 371, Vol. 1) writes :—With reference to a paragraph that appeared in the December number, your correspondent (T.G. F. W.) requested you to "stop the train on page 371 of the November number." No, I did not "reverse the plate in the camera"—it would take a cleverer man than I to do it. The "charming spot" is Barmouth, and there is, as you suggest, one line, a siding, and the one that the train is running on, which is the single main line of the Cambrian Railway. So there was no need for T. G. F. W. to get excited. As a matter of fact the line in question is never congested, the average hourly number of trains each way, being about one !

*[Other interesting replies unavoidably held over.]*

## READERS IN DIFFICULTIES.

### DIFFICULTY No. 65.—LOCO DERAILING ON CURVE.

F. H. (Farnham) writes :—I wish to keep my loco from derailing at a half-way round point in a curve which appears regular enough on plan. I think a check-rail would be the best. Please give me some instructions as to fitting the same to new radius tin-plate curves.

It is difficult to say without examining the actual line. Superelevation is the best cure for derailments due to high speed. Check-rails are only employed to prevent the flanges mounting the outer rail. We should want to know the wheel-tyre dimensions before we could advise *re* the check rail. Are you sure that there is no severe surface twist at the point of derailment ?

### DIFFICULTY No. 68.—SPIRIT-LAMP TROUBLE.

C. L. (Forest Hill) writes :—I have just completed a 2" gauge six-coupled tank engine, and I should be extremely obliged if you could inform me why the spirit lamp will not keep alight. The lamp itself burns beautifully, but when it is fixed in the loco the flames go out one after another—so does my temper. The engine is made exactly to the drawings supplied with the castings, etc. I tried it by firing it with a Bunsen burner and banking it up so that the wheels ran free. The boiler steamed perfectly with this, and when 80lbs. was reached I opened the starting tap ; for the next ten minutes the driving wheels, etc. were invisible, and there was one continual roar from the exhaust (I had uncoupled the leading and trailing wheels). The steam gauge is very disappointing ; it appears that the pipe clogs after using every time, which means that I have to take off the cab to blow through the pipe to clear it, which is extremely tiresome. Last time after the usual clearing the wretched thing didn't act at all. The boiler and fittings were all brazed and fitted for me, so it can't be my fault ; also I always boil the water before filling the boiler. If you can put me right here through the columns of *Model Railways*, I shall be pleased.

An auxiliary blower is almost essential to steam raising, and we would recommend either one of the commercial form or one built to Mr. W. G. Roblin's description. A steam blower is also useful after the steam is raised, as with this accessory perfect combustion of the spirit can be obtained. Methylated spirit requires a large amount of air, and if at all stifled does not burn with much heat. Open the smokebox front (or door if the model has same) during steam raising. Small pressure gauges are delicate, and in the  $\frac{3}{4}$ " size may soon get out of order. If the pipe gets stopped up through being near the water-level, where foreign matter may be floating, then fit a pipe inside the boiler pointing upwards and nearly touching the crown of the barrel. We have experienced this annoying trouble ourselves. We presume the gauge siphon pipe is fixed by a flange, and can be dealt with in this manner

*[We have several queries in hand which will be dealt with as soon as time and space permits.—EDITORS.]*

**MESSRS. BASSETT-LOWKE & CO.'S CATALOGUE FOR 1910.**

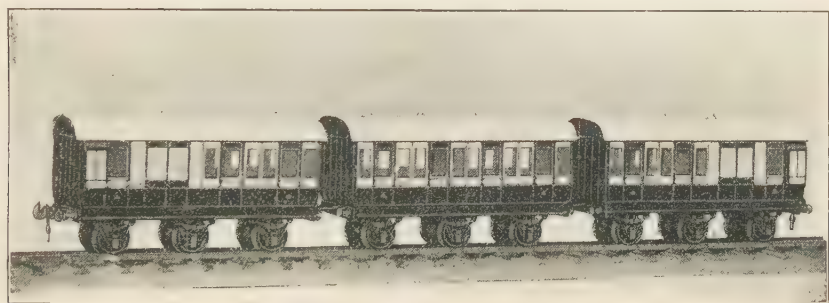
As mentioned in our last issue, we wish to draw our readers' attention to the above firm's new list for 1910.

A perusal of its pages will show that progress is still foremost in this firm's programme. In addition to the several lines already noticed in our pages, we would like to draw attention to the new "Lowko" track. This provides an excellent track for indoor railways where permanent way is deemed too expensive, and something better than the tin-plate track is required. It consists of hollow brass rail fitted to wooden sleepers by means of a special spring chair—no keys or solder being required. Materials for making this track can also be supplied separately at a reasonable price.

The castings and parts for the *Captain* electric locomotive, which was to be seen running at the Model Engineer Exhibition, are also listed.

In 1 $\frac{3}{4}$ " gauge steam engines we notice that they are supplying the L. & N.W.R. tank loco in steam. The new wagon stock has already been reviewed in our pages and is now familiar to all owners of model railways. The new List has photographic illustrations of these wagons.

An entirely new line has already been introduced in passenger stock in L. & N.W.R. colours. As will be seen by illustration, these are models of six-wheeled passenger stock, and are specially introduced for those who



require shorter coaches than the standard bogie coaches. They are identical in design and quality but only have four compartments. They will negotiate the old standard radius curves, as they are fitted with radial trucks of Clemenson's design. These are also supplied in close-coupled trains consisting of one coach and two composite brake "thirds" at each end. These models can be supplied in either gauges 0, 1, or 2, and should be very popular.

A new bogie coach and brake-van of M.R. standard design are also introduced for running in conjunction with the M.R. loco No. 1,000.

In the scale model department full details are given of signal interlocking frames and prices for each part.

A new series of wooden stations, huts, etc., which have already been described in our pages, are listed.

The Section "B" portion of the catalogue is also revised and brought up-to-date. Many new fittings and working models, too numerous to enumerate here, are described.

Messrs. Bassett-Lowke & Co.'s annual catalogue has now reached an encyclopedic status, and should certainly be in the hands of every model engineer.



### AN EXTENSION OF PREMISES.

Owing to the great increase of business in London, Messrs. Bassett-Lowke & Co. have found it necessary to remove into larger premises, at 112 High Holborn, opposite the Holborn Station of the Piccadilly Tube.

The premises comprise a spacious shop with every convenience for the display and sale of the firm's specialities. Separate counters are provided for the display of various sections of the supplies, each being provided with appropriate showcases.



The comfort of visitors has been studied by the equipment of a permanent exhibition in the showroom at the rear of the shop, running tracks for the testing of model locos under power, compressed air for running stationary models, and a testing tank for trying model power boats, enable any description of model to be examined and tried in comfort. Visitors are always welcome, and there is sure to be much to interest the enthusiast in any branch of model engineering. No. 112 is on the opposite side of the road, within sight of the well-known old shop, and no difficulty should be found in reaching the new premises.

### MIDLAND RAILWAY LOCOMOTIVE OFFICIALS.

MR. R. M. DEELEY, the locomotive superintendent of the Midland Railway who followed Mr. S. W. Johnson, having retired, the position has now been divided so that the business of constructing and repairing the locomotives is to be under the control of one officer—the chief mechanical engineer; whilst the supervision of the running of the engines will in future come under the general superintendent's department. The new chief mechanical engineer is Mr. Henry Fowler, M.Inst. C.E., etc., who served his apprenticeship on the L.Y.R. at Horwich, and later became chief of the testing department at the Derby works of the Midland. Mr. Lewis C. Geach is the first holder of the new post of superintendent of motive power: in the late *regime* he was known as running superintendent under Mr. Deeley.



# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 4.

APRIL, 1910.

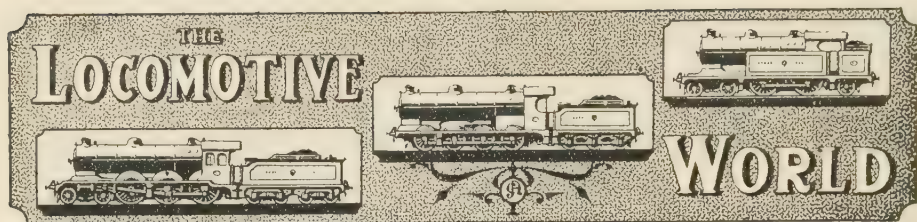
## BETWEEN OURSELVES.

SEVERAL readers of *Model Railways* who had not discovered the journal in January, 1909, are asking us to reprint the number bearing that date. The crux of the question is, how many are required: but if we can obtain a reasonable number of "guarantees" to take a copy of such reprint, we are perfectly willing to go to the expense of printing another edition of our first number. We shall be glad if readers in need of the same will kindly send us a postcard on or before May 10th saying that they will either take a copy of the proposed reprint, or a bound volume for the whole year (1909)—a good number of which can be sent to the binders as soon as the first issue is available,

We would specially draw our readers' attention to the excellent articles in this issue describing the respective model railways, written by Mr. W. H. Jubb and Messrs. G. H. and A. H. King. We wish more of our readers who have anything out of the ordinary would give their fellow readers the benefit of their experience in building and running model railways and locomotives.

At the moment of going to press, Mr. C. W. Bartholomew's rebuilt locomotive "Petrolia" is undergoing its tests at Blakesley Hall. The engine has been remodelled into a 0-4-4 type tank engine and is to be used for goods work almost entirely.

It may interest our readers to know that the firm of Messrs. W. J. Bassett-Lowke & Co. has been converted into a Private Limited Company under the style of Bassett-Lowke, Ltd. The Registered Office will be at Northampton.



## THE EXPRESS LOCOMOTIVES OF THE NORTH-EASTERN RAILWAY.

(Continued.)

BY CECIL J. ALLEN.

THERE is no doubt that the variety of express locomotive types now engaged in active service on the North-Eastern Railway is one unequalled by any other line in the British Isles, and, whatever the principles may have been that have regulated this company's locomotive designs in the past, it is tolerably certain that they have not included any efforts towards standardization in construction. To describe each type in detail would not only occupy this article in *Model Railways* for at least a year to come, but would also infringe on the sphere of an excellent little treatise on the subject which has been compiled by Mr. J. S. Maclean, entitled the *Locomotives of the North-Eastern Railway*. It will be interesting, however, before proceeding to the consideration of the present standard types of North-Eastern express engines mentioned in the last number, to note how many types and locomotives of the "Old Brigade" are still engaged on express service on the N.E.R.

Of Mr. Fletcher's design no less than seven different types of 2-4-0 locomotives, numbering in all 114, still survive, and are now largely confined to local train working in the Cleveland district of Yorkshire. The earliest of these were built in 1870, and they have thus seen forty years' service. On Mr. Fletcher's retirement in 1883, Mr. McDonnell succeeded him as locomotive superintendent, and, during his brief *régime* introduced a class of twenty 4-4-0 engines, the first of this wheel arrangement built on the North-Eastern Railway which survived for any length of time in that form. During the interregnum which followed the latter gentleman's resignation, a locomotive committee was formed, under the chairmanship of Mr. H. Tennant, the then general manager, and a further class of twenty 2-4-0 locomotives was introduced, which performed noteworthy service at the time, the engines being forthwith named "Tennants."

Mr. T. W. Worsdell succeeded to the office of locomotive superintendent in 1885, and all express locomotives of his design, with but few exceptions, were thenceforward constructed as two-cylinder compounds on the Worsdell-von-Boiries system, having both cylinders inside the frames. All express engines so constructed have been rebuilt by his successor as two-cylinder simple locomotives, with the sole exception of No. 1619, whose history was described in the January issue. Mr. T. W. Worsdell's first engines were two of the 2-4-0 type, known as class D, and externally they set a fashion which has remained more or less standard on the N.E.R. until the present day. Thenceforward the leading bogie was permanently introduced as an integral feature of express locomotive design, which has also been adhered to since in every express locomotive built by the company. The first engines thus built were twenty-five compounds of the 4-4-0 type, and ten of similar dimensions,

in this case simples, known as classes F and F1 respectively, with 7' 6" driving wheels. A 2-4-0 class of mixed traffic engines, with 6' 0" driving wheels was built here, but these engines cannot be properly classed as express engines, although they have been used to some extent on passenger service. They were nicknamed the "Waterburys" on account of their strict time-keeping propensity, and were also simples. The last express engines built to Mr. T. W. Worsdell's designs were classes I and J, of ten and five locomotives, with driving wheels 7' 0" and 7' 7 $\frac{1}{4}$ " diameter respectively.



N.E.R. LOCOMOTIVES, CLASS R AND CLASS R1.

(These photographs show the recent improvement in the 4-4-0 type on this line.)

Mr. Wilson Worsdell now succeeded his brother in 1890, and for twenty years he directed the locomotive affairs of the N.E.R., until his recent retirement. His first engines were twenty of the 4-4-0 type with 7' 1 $\frac{1}{4}$ " driving wheels, class M1, of which one was the renowned 1619. The others were all simple locomotives, and their success in working was such that they were shortly followed by thirty more 4-4-0 engines, class Q, with the same size driving wheels, but cylinders 19 $\frac{1}{2}$ "  $\times$  26" as against 19"  $\times$  26" of their predecessors. The latter are easily distinguishable by the clerestory roof fitted for ventilating purposes to the cab. These two classes did very good work about the time of the great "Race to Aberdeen" in 1895, and the North Eastern Railway, in order that they might not be behind in any future event of the same character, equipped themselves in 1896 with two magnificent



"racing" machines, Nos. 1869 and 1870, class Q1, which are distinguished at the present time by possessing the largest coupled wheels in the world, viz., 7' 7 $\frac{1}{4}$ ".

The later engines, whose history has been briefly mentioned, are mostly employed at the present time in the Sheffield, Leeds, Hull, Harrogate and York districts, and on important branch lines such as the Newcastle and Carlisle, working also certain of the slower trains on the main line, while the earlier express engines are almost all confined to branch line working. Those types now about to be described in detail represent the present standard for express service, working indiscriminately the whole of the faster and heavier of the express services of the line, notably the Anglo-Scottish trains by the East Coast route. The period of locomotive history on which we now enter commences in 1899 with the well-known R or 2011 class, of which altogether fifty-nine have now been built, thirty between 1899 and 1901, and twenty-nine further from 1904 to the present time.

These engines represented a great advance in size and power at the time they were constructed over any locomotives previously designed for the North-Eastern Railway, and even at the present time they have but few rivals for elasticity in working as regards adaptability to either high speed or hauling capacity in this country. The record runs mentioned in the last number were all obtained with engines of this class, and it is no uncommon thing for an R class locomotive to haul even 300 tons or more over the 44 $\frac{1}{2}$  miles from Darlington to York in 46 or 47 minutes. In fact, they are frequently called upon to undertake the haulage of heavy expresses usually worked by 4-4-2 or 4-6-0 locomotives, or the larger 4-4-0 locomotives of the R1 class, and on several occasions I have known them to acquit themselves even more creditably than the bigger engines under these conditions.

The R class engines have the following dimensions. The driving wheels are 6' 10" diameter, the bogie wheels 4' 0" diameter; the cylinders are 19" diameter by 26" stroke. Piston-valves are fitted to these engines, and the cylinders are inclined towards the driving axle at an angle of 1 in 11. The heating surface represents a 20 per cent. advance on that of the largest engine built previously, being 1,527 sq. feet, while the area of the fire-grate is 20 sq. feet. The working pressure also reached the notable figure for that period of 200lbs. per sq. in. The weight available for adhesion is 35 $\frac{1}{4}$  tons, spread over a coupled wheel-base of 9' 6"; the total weight is 51 $\frac{3}{4}$  tons, and the total engine wheel-base 23' 9". A large six-wheeled tender is provided, with a capacity for 5 tons of coal and 3,537 gallons of water. The total weight of engine and tender in working order is 89 $\frac{1}{2}$  tons.

So rapidly, however, were the express trains increasing in weight that the very same year—1899—saw the introduction of the first ten-wheeled express engine on the North-Eastern Railway. This was of the 4-6-0 type, and was, moreover, the first locomotive of this wheel arrangement to be built in England for express service, setting a fashion which has since become increasingly and almost universally popular. The Highland Railway Company already owned 4-6-0 passenger locomotives, but these had been built to meet entirely local conditions, especially as to grading. Thus the North-Eastern Railway fully maintained its reputation as to the experimental in locomotive design, but curiously enough, it is, as I have already mentioned, practically the only company in this country which has definitely abandoned the 4-6-0 type in favour of the "Atlantic" and high-powered 4-4-0 locomotives for express service, except possibly the Great Central, which is governed by vastly different conditions of loading. The 4-6-0 North-Eastern



locomotives now work principally on fast goods service, only appearing on the main line in charge of certain very heavy express trains, which are not booked at the highest speeds.

Two distinct 4-6-0 types have been built. The first type is known as class S, and numbers in all thirty-seven engines, of which the distinguishing feature is the diameter of the driving wheels—6' 1 $\frac{1}{4}$ ". The principal dimensions are as follows:—The bogie wheels are 3' 7 $\frac{1}{4}$ " diameter, and coupled wheels as already stated. The heating surface totals 1769, sq. feet, and the grate area 23 sq. feet, the working pressure being the North-Eastern standard of 200lbs. per sq. in. The cylinders are of the large diameter of 20", with a stroke of 26". The weight available for adhesion, spread over a total driving wheel-base of 14' 0", reaches the notable total of 46 $\frac{1}{4}$  tons out of a total weight of 62 $\frac{1}{2}$  tons; the total engine wheel-base is 26' 0 $\frac{1}{2}$ ". The tenders contain 5 tons of coal and 3,701 gallons of water, weighing together with the engine, in working order, 101 tons.

With a view to the attainment of higher speeds, a matter somewhat limited by the small size of the driving wheels, a further five engines, named class S1, were built in 1900 with 6' 8 $\frac{1}{4}$ " driving wheels. In other respects these engines closely resembled their predecessors, being identical in respect of total heating surface, grate area, working pressure and cylinder capacity. As regards heating surface, an increase from 15' 0" to 15' 10 $\frac{1}{2}$ " in the length of the boiler was met with a decrease in the number of tubes from 204 to 193, leaving the total unchanged. The pitch of the boiler from rail-level was raised from 8' 2" to 8' 6" to clear the increased diameter of the driving wheels. The adhesive weight was increased to 52 tons, spread in this case over a wheel-base of 15' 2": the total wheel-base became 27' 6", and the total weight of engine 67 tons. The tender capacity for water was raised to 3,940 gallons, bringing the total weight of engine and tender in working order to 107 tons. It may be mentioned with regard to these engines that the increase in wheel spacing owing to the larger diameter of the driving wheels resulted in the main connecting-rods reaching the phenomenal length of 11' 4 $\frac{1}{2}$ ".

As regards the order of building classes S and S1, the first ten of the former class were turned out in 1899 and 1900. The first three—Nos. 2001-3—were specially shortened in length in order that they might be turned on a 50' 0" turn-table, which necessitated the employment of a very short cab with only one window. They were built with ordinary slide-valves, and also without flanges to the centre pair of driving wheels, with a view to greater ease in running over curves with such a long wheel-base. The later engines of the type, however, have all been arranged with Smith's patent piston-valves, flanges to all wheels, and an extension of 2' 0" at the trailing end, allowing for the standard style of cab to be fitted. Six months after construction the three pioneer locomotives were altered to conform to these later engines in each of the details mentioned. No. 2006 of this class was exhibited at the Paris exhibition of 1900, and was awarded the Grand Prix for excellence of design and workmanship. Class S1, of five locomotives, was also turned out in the year 1900, and the 4-6-0 type then remained constructionally in abeyance until 1906-8, when a further twenty-seven engines of the original class S were built. These are identical with those described in all respects, save that the last twenty have been fitted with a long coupling-rod splasher running right from the cylinders back to the cab, after the style of the new compounds Nos. 730 and 731.

*(To be continued.)*

# A MODEL MIDLAND COMPOUND, No. 2631 (2" GAUGE);

AND FURTHER NOTES ON THE

## GREYSTONES MODEL RAILWAY.

BY W. H. JUBB.

SINCE July last, when the first notes on the G.M.R. appeared in *Model Railways*, the writer, owing to a great deal more space now at his disposal, has been enabled to considerably enlarge the railway. It is now laid in a room 19'  $\times$  16', and has a double continuous track, the total length of track, including sidings, being nearly 120'. This is on a wood structure, the track being same as was used previously, tin rail on wood sleepers; but the writer now regrets that the new "Lowko" rail and points were not on sale when the line was relaid, as these are superior to tin rail, but not so expensive as scale permanent way.

There are three roads at the station—up, down, and loop for locals—and three roads of sidings also. The water-tower seen in photograph is a splendid addition to a goods yard, is extremely useful, and also looks more business-like than the old jug and funnel method of filling the boiler. Turntable runs on iron rollers on a circle of tin rail laid in pit, and is 2' 2" in length.

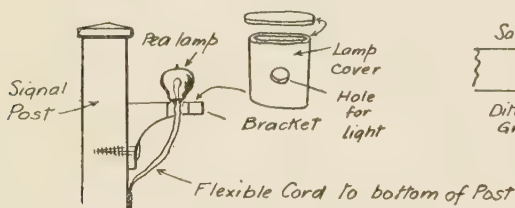


FIG. 1.—SKETCH OF  
SIGNAL.

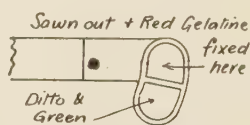


FIG. 2.—SKETCH OF  
SPECTACLE PLATE.

Signals are now all electrically lighted. The lamps are the same as those fitted in electric scarf pins, and can be purchased with about 2' of flexible cord ready fitted. These are much better than the pea loop lamps with two bare wires attached, as unless great care is taken there will be a good deal of trouble owing to short circuits. The signals are built from the sets of parts, and the flexible cord on lamp is threaded through the lamp bracket, which is supplied with a hole, the lamp cover being  $\frac{3}{8}$ " brass tube, with a small piece of flat brass soldered on one end for cover, and one hole  $\frac{1}{8}$ " diameter bored in one side of tube for light to spectacle plate, and hole  $\frac{1}{16}$ " diameter for light to tell-tale. The sketch herewith will explain clearly. The lamp cover is filed dead level at bottom, and glued to lamp bracket. The flexible cord is carried down signal-post and through wooden superstructure of the railway to the main cables. The spectacle plates, as supplied by Messrs. Bassett-Lowke, are solid lead; but these were sawn out with a fret-saw, and coloured gelatine (green and red) glued just round the edges and fixed in place, as shown herewith. This may seem a lot of trouble, but it is well worth it all. The signals are now also fitted with ladders. These are made from flat brass wire  $\frac{3}{16}$ "  $\times$   $\frac{1}{16}$ " for sides, and hard brass wire  $\frac{1}{16}$ " round for rungs. The two sides are clamped together and holes  $\frac{1}{16}$ " drilled at intervals of  $\frac{1}{16}$ ", the round wire rungs put in position, soft-soldered, and the whole then filed up.

The signals are operated from a ten-lever locking frame, also built by the writer, to Mr. Winteringham's specifications which appeared in the *Model Engineer*.

The cattle wagon and timber truck were built from Messrs. Bassett-Lowke's sets scale model parts, and make very fine models.

The dining-car is, with the exception of bogies, which are Bassett-Lowke & Co.'s 2" gauge scale model, the writer's own construction throughout. It is built of birch framing screwed together, and white-wood body and roof. The kitchen is in the middle, with first and third-class dining compartments at either end. The windows are thin mica, and the outside panelling is thin cardboard carefully glued on. The whole is painted North-Western colours.

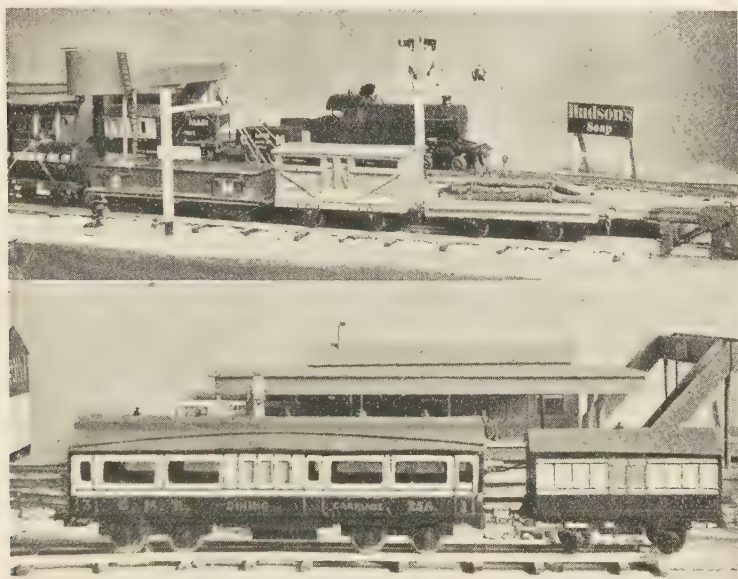


FIG. 3.—VIEWS ON THE GREYSTONES MODEL RAILWAY.  
(The lower picture shows the new dining carriage.)

Dining compartments are fitted with seating accommodation for sixteen third-class and sixteen first-class passengers, and have dining tables and vestibule at either end. In the roof of each compartment, and also in the kitchen, is a 4-volt miniature screw lamp. These are arranged in parallel and are lighted by a 4-volt, 4 amp. boat accumulator, which is carried in the fruit and milk van shown in photo. This is of same construction as the diner, and has a loose roof. Flexible cord is used for the connections between the cars. The bogies on the diner run beautifully smooth, and she will keep the track at any speed. The writer is building a suite of cars, all to be lighted, and also intends fitting electric headlights to the engine.

The station and goods yard are electrically lighted by a 30-amp. 4 volt. accumulator, and miniature metal filament lamps.

The model M.R. compound, 2" gauge,  $\frac{7}{16}$ " scale, took up about six months' spare time to build. The dimensions were taken from the drawings of the

well-known  $\frac{5}{8}$ " scale model which appeared in the *Model Engineer* in September, 1903. These were all reduced to  $\frac{1}{16}$  the sizes given, which works out to  $\frac{7}{16}$ " scale.

The principal dimensions are as follows :—

|                                                                                                                                                                                                                                                                                            |                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| Engine—Cylinders, $\frac{7}{16}$ " $\times$ $\frac{3}{4}$ " (Bassett-Lowke's stock pattern),                                                                                                                                                                                               |                                                     |
| Driving wheels $2\frac{7}{8}$ "                                                                                                                                                                                                                                                            | 20 spokes.                                          |
| Bogie wheels, $1\frac{3}{8}$ "                                                                                                                                                                                                                                                             | 10 "                                                |
| Bogie wheelbase, 3".                                                                                                                                                                                                                                                                       | Driving wheelbase, 4".                              |
| Boiler (outer, $10\frac{1}{4}$ " $\times$ $2\frac{7}{16}$ ", inner $8\frac{3}{4}$ " $\times$ $1\frac{7}{8}$ "; five $\frac{3}{16}$ " water-tubes, T-shape down-comer, hard-soldered throughout; fitted with "Lowko" regulator, pressure gauge, water gauge, check valve, and safety valve. |                                                     |
| Length of engine over all, 15".                                                                                                                                                                                                                                                            | Working pressure, 80lbs. to sq. inch.               |
| Fired by methylated spirit lamp, six $\frac{3}{8}$ " wicks.                                                                                                                                                                                                                                | Slip eccentric reversing.                           |
| Boiler centre from rail, $4\frac{1}{8}$ ".                                                                                                                                                                                                                                                 | Superheating coil carried from smokebox to firebox. |
| Height to top of funnel, $5\frac{7}{8}$ ".                                                                                                                                                                                                                                                 |                                                     |
| Width over footplates, $3\frac{5}{8}$ ".                                                                                                                                                                                                                                                   |                                                     |

The buffer-beams were cast from the writer's own pattern and the frames sawn from  $\frac{1}{16}$ " hard brass. The frames are screwed together and have

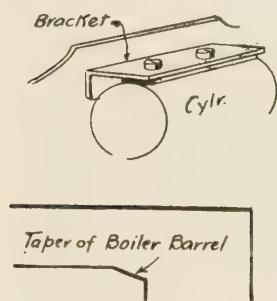


FIG. 4.—FIXING CYLINDERS, AND BOILER THROAT-PLATE.

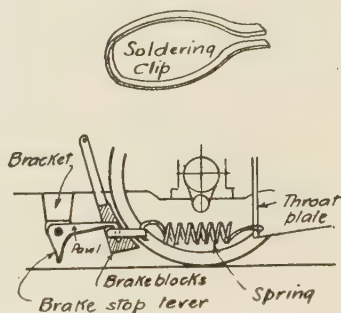


FIG. 5.—DETAILS OF AUTOMATIC BRAKE, AND SOLDERING CLIP.

transverse frames at firebox back-plate, throat plate, over bogie and at motion plate, for extra strength.

The cylinders are screwed to angle brass, as shown. It will be noted from photo that they are kept high up, so as to clear bogie. The front foot-plate is loose, and can be removed at once when it is necessary to get to cylinder covers. This has been found to be a great advantage. The bogie has one central pin working in seat of cross casting, and has  $\frac{1}{2}$ " side-play. It will keep the track at top speed and will take all gradients.

An extra flue is fitted to the boiler, through the dummy safety-valve casing, and this is found to be an advantage. The funnel and dome are a stock pattern. A brake to work from rail is fitted to engine. Although a similar one has already been shown fitted to a clockwork engine, it may interest the readers of *Model Railways*. Sketch herewith will be more easily understood than a written description.



It will be seen that when the brake is off, a pawl is holding it by a bar which stretches transversely between the two brake blocks. A strong steel spiral spring is distended between the throat-plate and an equalizer which is fixed to brake hangers. When the signal is "on," a catch between the rails engages with the brake block catch, the forward motion of the engine presses it backwards, the pawl lifts, and the spring pulls on the brake. A lever in cab again sets the brake in position for the engine to start.

The splashers, cab, etc., are built up from G.S. sheet, and the mouldings are half-round G.S. wire with a catch as section, soft-soldered into position.



FIG. 6.—MR. W. H. JUBBS' MODEL 2" GAUGE MIDLAND COMPOUND LOCOMOTIVE.

(The lower picture shows the turntable.)

The best method of holding these mouldings in position whilst soldering is to clamp the sheet and the wire together by horseshoe-shaped iron wire clamps placed about two or three inches apart. Put on plenty of flux, get metal and wire nicely hot, then solder will strike evenly. When cold, surplus solder can be riffled off with a file tang.

The tender runs on two four-wheel bogies, and carries one half-pint of spirit. Boiler-feed pump is also fitted in tender. Dummy springs are fitted on bogies.

Tender dimensions :—

Length over all, 11".

Height to top of side from foot-plate,  $2\frac{1}{2}$ ".

Wheels,  $1\frac{3}{8}$ " diameter.

Bogie wheel-bases, 3".

Bogie centres  $4\frac{7}{8}$ " apart.

Width,  $3\frac{5}{8}$ " over footplate.

Total length of engine and tender, 26".

The boiler steams well, and engine will run as long as fuel and water last. Drip-spirit feed is fitted. She was first painted Midland colours, but the writer has found the special "lake" supplied by Messrs. Bassett-Lowke does not stand heat nearly so well as the Great Western green also supplied by this firm, neither has the Midland colour such a high gloss. Therefore she is now enamelled G.W. green, and this enamel has stood continuous running on one occasion every night for a week for four hours each night—without showing signs of deterioration except right between the splashers, and here only very slightly.

The tank engine shown in photo is a rebuild of the one illustrated in *Model Railways* last July, it now having a much larger boiler and the 4-4-2 wheel arrangement altered to a 4-4-0, so as to facilitate running round curves. The outer boiler is  $2\frac{3}{4}$ " diameter and the inner  $2\frac{1}{16}$ ", five  $\frac{3}{16}$ " water-tubes being fitted to a T-shape down-comer. She steams magnificently, making steam when running. The driving wheels are  $2\frac{5}{16}$ " diameter, and cylinders  $1\frac{7}{8}$ "  $\times$   $\frac{3}{4}$ ".

The tunnel end shown in photo is made from  $\frac{1}{8}$ " Bristol board backed up by wood. The abutments are made from blind sticks with cardboard facings. The whole is painted stone-colour, and is banked up by earth and artificial moss. The tunnel is 5' long and on the curve.

Regarding boiler on tank engine, this has the barrel made wider at throat plate than at smokebox end, and has been found to steam better, owing to the more complete combustion of spirit. Top of boiler-barrel is level, but taper is as shown herewith.

I should be pleased to supply particulars of either engine to any other reader of *Model Railways*, or to have an evening with any other Sheffield railwayist should he communicate with me.



AN edition of the *Quarterly Review*, published in 1837, came into the writer's possession a few weeks ago, and in it is a review of a book, *Home Tours*, by Sir George Head to wit, containing some accounts of railways in their early days, which should prove very interesting reading for the readers of *Model Railways*. Some of Sir George's railway rides to the present-day traveller will appear humorous, although it is doubtful if the humour of the situation would appear to the traveller of 1837.

After referring to the poets Cowper and Wordsworth in their references to aviation (then called aerostation) and railways, Sir George goes on to say, "These motions and means seem if they were endeavouring to fulfil the prayer of another poet who called upon the gods to annihilate both time and space in order to make two lovers happy. We are not, however, yet at the end of our speed nor at the end of our railways. The railways have only put in abeyance a notable project for laying down tubes instead of forming roads, and propelling passengers through them by blast at the rate that a cannon ball travels. And with regard to railroads, we are gravely told that there is no

insuperable difficulty to prevent the formation of one from Calais to Pekin." This of course has now practically come about since the laying of the Trans-Siberian Railway.

"Looking only at possibilities," says the reviewer, "if the great highways should all be converted into railroads, the byways would still be left for those who like to travel at leisure, and to see the country through which they pass."

"Nothing," says Sir George Head, "can be more exhilarating than locomotion on an established railroad, but of all travelling, that on a branch line is the most irksome; delays and unpunctuality being unavoidable *owing to the uncertain number of people to be conveyed.*" In one of his journeys on such a line the surplus power of the engine was expended in pushing before it half-a-score of laden coal wagons; and in the rear of the carriages with the passengers, heavy goods and enormous logs of timber were yoked astern. Between two such heavy uncontrollable bodies, one before and the other behind, they were most "cruelly jerked and bumped all the way."

On another occasion this observant tourist was nearly three hours in getting over eight miles of railroad. He had proceeded about a mile and a half when the driver pulled up and demanded sixpence for fare for the part of the distance performed. He goes on to say, "I then asked the driver how I was likely to accomplish the remainder of my journey. The man replied that I must wait on the road whilst he went back to Liverpool to bring more passengers, adding as a consolation that he would not be absent more than an hour. Here I waited for one and a quarter hours, at the bottom of an inclined plane, to the summit of which the carriages are drawn by a stationary engine and an endless rope, when they descend the declivity on the other side by their own gravity. As the laden carriages are thus raised, an iron skid is attached to the last, in case the rope should break." Having nothing to do, Sir George amused himself by accompanying the man in charge of the carriage with the skid for a few trips.

After the arrival of the driver with some more passengers, "a heavy looking old man took charge, and commenced business by demanding ninepence, the remainder of the fare to Runcorn. Under this person's guardianship it was necessary to descend the inclined plane, a performance not altogether agreeable, as somehow or other I had an idea that the old man would run us down too fast. As it happened in the result, the fault was on the opposite side, as he ran us down too slow. The engine-man, moreover, instead of taking the vehicle, as is usual, to follow in the rear, proposed to place it in front, and so, as it were, dragging after him a train of heavy laden coal wagons, push, or rather kick it along. And matters being thus disposed, we began to descend the declivity. The carriage was a sort of mongrel vehicle, one part open and the other closed. I took my station in the open part with my back in the direction of the motion, and had a full view of everything that followed on the line, particularly our engine waiting at the top to give the old gentleman in charge sufficient time to get down. The engine-man, miscalculating distance, and the celerity of his own movement, now came trundling down the hill after us at a winning pace. I had scarcely made up my mind that a collision was inevitable, when we got a tremendous thump from the huge body, weighing forty tons, and with such force, that though not in the least hurt, I was thrown violently from my seat. We were now taken in tow by another engine, after which it became necessary to walk a mile and a half to the Mersey, so that we could ferry across, and so complete our journey to Runcorn."



The *Quarterly Review* also tells us that "as a striking example of enterprise a day coach performs the journey between London and Manchester, within an hour of the time in which it is accomplished by the combined agency of the coaches and the Liverpool and Birmingham Railway." The paragraph proceeds to say that the spirited conduct of the proprietors in keeping such a coach on the road in defiance of the extraordinary power with which they have to contend, is a striking specimen of moral energy and skill. One of the most satisfactory results to be expected from steam travelling is that it will remove from England the old reproach of being the hell of horses. . . . . There is also this advantage in railroad travelling, that *fewer accidents will happen*. And when they occur, they cannot easily be concealed."

Sir George chanced, when travelling in a stage coach, to see an unfortunate man pitched from the top. "I saw him," he says, "with his heels up and his head down, and in that position he came down with the full force of gravity. Our passengers were eager to render assistance, but the driver whipped on his horses in spite of entreaty and remonstrance. Not to this moment do I know how this poor fellow fared. The overthrow of a train of passengers would be a catastrophe. The chief cause of danger, however, is removed, because there can be no overloading, and the lives of passengers can never be put in jeopardy by the rivalry or recklessness of drivers."

"It is not a hundred years ago that a journey to London was considered an act of such imprudence for a respectable provincial as to be a fit subject for exposure on the stage! Expeditions from London to any distant part of the country for mere holiday were at that time unheard of. . . . . But in the further change which steam locomotion will bring about, it is greatly possible that those who travel on business will be greatly multiplied."

The review ends up with the following passage, "There can be no possible competition between blood horses and steam power, however cruelly the experiment may be made. When any railway is completed, stage coaches can compete with it neither in speed or in prices. Nor will it be worth their while to race against each other, because all hasty travellers will prefer thirty miles an hour to any rate at which the most inhuman driving could keep up. Even in this age of movement, there is a very considerable number of persons to whom travelling by coach would be a pleasure, and it must now be to the advantage of coach proprietors to consult the safety and comfort of their passengers, which up to the present have been altogether disregarded."

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### A CURIOUS OCCURRENCE.

ON a branch line not twenty miles from the Metropolis the platelayers in charge of the section reported to headquarters that they had noticed every eight or nine feet small semicircular indentations in one of the rails extending the whole length of the line, and failing to diagnose the presence of these marks other than that they were caused by the locomotive, asked for the engine which had been working on the section to be examined. On doing this, the locomotive department found fixed in the tyre of the leading wheel of the engine a small steel bicycle ball, which was so firmly embedded that it had to be chipped out. The wonder is how it got there, but we suspect the small boy who hovers about level crossings, alternately taking numbers and names of locomotives and placing coins and other objects on the rails to be flattened out, knows something about the matter.





# MODEL LOCOMOTIVE CONSTRUCTION

## DESIGN FOR $3\frac{1}{4}$ " GAUGE MODEL L.N.W.R. "PRECURSOR."

(Continued from page 92.)

THE drawing (Fig. 10) reproduced below shows the arrangement adopted for the fulcrum of the anchor links mentioned in the last issue. The brackets are of  $\frac{1}{8}$ " brass or steel plate. They are set inwards as indicated and riveted to the main frames by two  $\frac{3}{32}$ " copper rivets in each bracket. The tubular distance pieces need not be fixed to the  $\frac{1}{8}$ " steel spindle, and should allow of quite a free movement of the anchor links, without undue shake.

The connecting rod is shown in plan in the accompanying Fig. 11, which supplements the drawing (Fig. 9) given in our last number. The rod is of the standard L.N.W.R. strap-ended type, and provides for a similar method

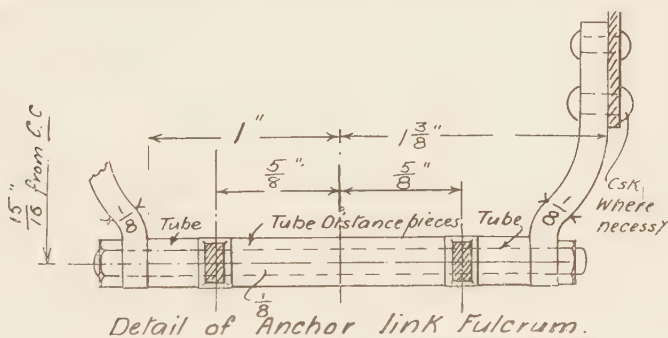


FIG. 10.

of securing the strap. The little end is not fitted with a brass, but is best case hardened by heating the same in a heap of powdered yellow prussiate of potash and then plunging into cold water. The same process should be applied to the centre of the rod in which the top pin of the correcting link works. Soft pins may be used in both cases, as it is comparatively easy to replace such a pin should a large amount of wear take place. In fitting the cotter pin in the strap of the big end, the holes should be reamed out so that the tendency of the cotter, when driven in, is to force the wedge-shaped end of the strap up against the big end of the rod. The second pin is circular, and secures the brass as well as assisting in holding the strap in its proper position. The brasses are of course in two halves, and have circular flanges instead of the square ones in the original locomotive.

The crank axle should be made of steel and is of the square webbed variety. The best method of making this is to rough the webs out of a slab

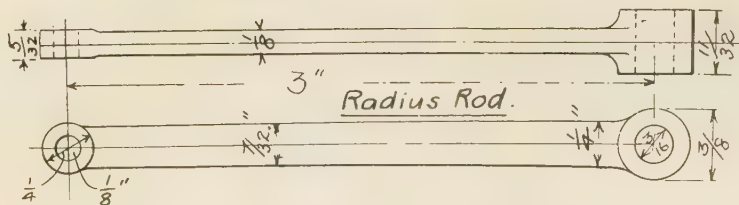


FIG. 12.—RADIUS OR VALVE ROD.

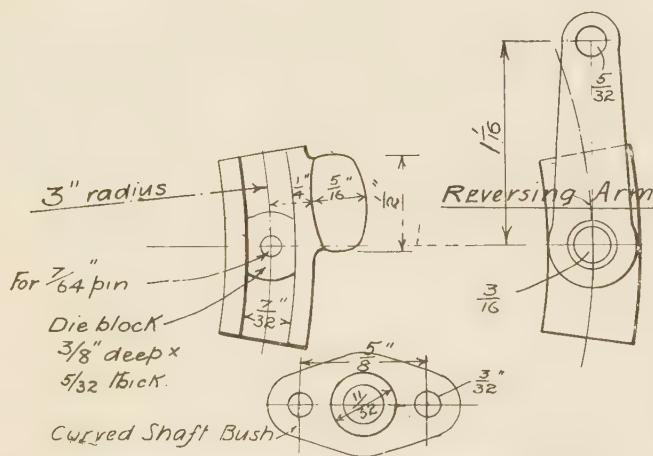


FIG. 13.—WEIGH SHAFT AND CURVED SLIDES.

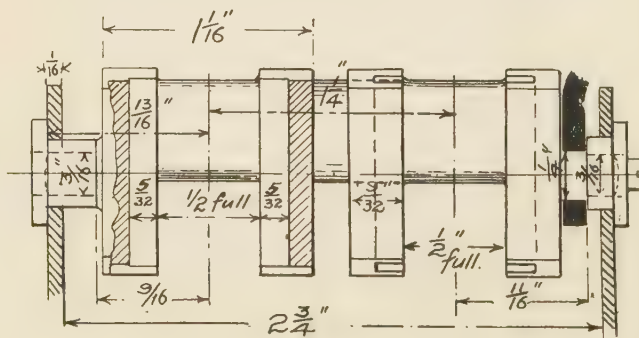


FIG. 14.—DETAILS OF WEIGH SHAFT.

of  $\frac{5}{8}$ " thick mild steel plate, and then to twist the cranks at right-angles, the centre portion being made hot to allow of this being readily done. The crank may then be turned to size in the lathe and the flat portions of the webs filed up by hand. The left-hand crank should lead, but except for the balance weights in the wheel castings which lead the outside coupling rod crank pin, this does not matter in the least. The brasses of the big end should be fitted so that they are not too tight (laterally) on the pins, otherwise the engine will be too "stiff" and the wheels will not readily conform to the inevitable inequalities of the surface of the road. In the running gear of a locomotive (real and model) the fitting should not be too close, but of course this must not make an excuse for careless workmanship. The art is to know where to allow the slackness in the working joints and where such is not advisable.

The radius rod (Fig. 12) is a simple piece of file work, but will be found to take a fair time to do nicely, as the enlarged end which fits the eccentric pin necessitates it being made from a larger section of steel than would otherwise be the case. The length of the rod between the centres of the holes is exactly the same as the radius of the curved slide, hence the name given to this part of the motion. It is however sometimes called the valve rod.

The curved slides of the weigh shaft represent the greatest difficulty of the whole valve gear, and upon the accuracy of the slides the efficiency of the gears depends. There are many methods whereby the weigh shaft may be made, but one of the best is that shown by the drawings, viz., the built-up method, in which a ring of metal is first turned up to the dimensions given, and then sawn into pieces of suitable length. These pieces are silver-soldered to the back bar of metal (made out of  $\frac{5}{16}$ "  $\times$   $\frac{1}{2}$ " stuff), the slides being mounted on a machined jig to ensure their proper alignment. The end pivots are then fixed to the outer slides, and except for the lever or reversing arm, the weigh shaft is completed.

The hole in the main frames in which the weigh shaft works is bushed by brass bushes turned up out of standard gland castings to the dimensions shown in the accompanying drawings.

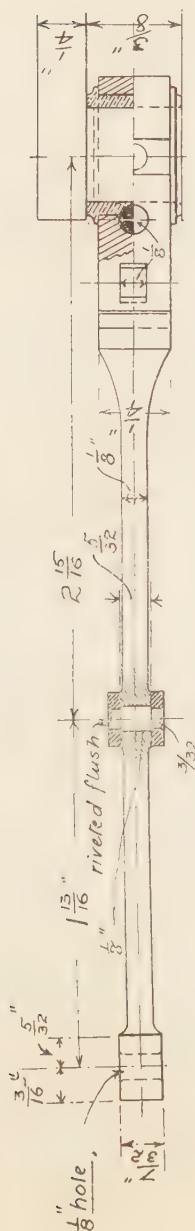


FIG. 11.—PLAN OF CONNECTING ROD.

AN arrangement has been made by the Great Western Railway Company whereby parcels can be taken to the company's stations and booked to any part of the world. The value of the innovation will at once be appreciated when it is remembered that the public are not generally well acquainted with the routine of forwarding parcels to places outside their own country.







## A MODEL $7\frac{1}{4}$ " GAUGE "PRECURSOR."

READERS who had the pleasure of visiting the Model Engineering Exhibition in October last will remember that the only thing of interest on the writer's stand was a partly finished model of a 4-4-0 type express locomotive built for the standard  $1\frac{1}{2}$ " scale gauge of  $7\frac{1}{4}$ ". This model has since been finished, as the accompanying photographs show.

The exterior of the engine is made exactly one-eighth full size of the famous L.N.W.R. "Precursors," and in other details the character of the original is as far as possible carried out.

The cylinder castings are standard with those used for the four-coupled tank engine built for Mr. H. F. Gerhartz and illustrated in our issues of

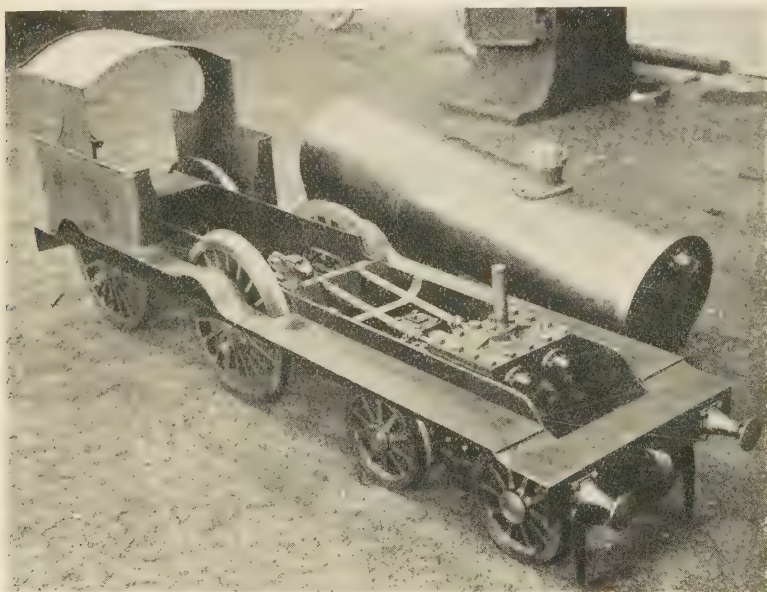


FIG. 1.—PARTLY-FINISHED MODEL  $1\frac{1}{2}$ " SCALE "PRECURSOR"  
AS EXHIBITED.

September and January last. The valve gear, however, is different, the writer's "uncorrected" modification of Joy's gears being substituted by a corrected motion in which Sir Percival Heywood's swing link is employed. This alteration in gear has allowed a longer stroke to be employed, which is desirable in an express type locomotive with a comparatively large driving wheel; the only alteration in the cylinder to effect this being a thinner piston, which was originally considered in designing the cylinders for the model tank locomotive above referred to.

The general arrangement of the valve gear is shown on the double-page drawing included herewith, and it will be seen that the motion is derived entirely from the up-and-down component of the movement of the connecting rod. The latter has a projecting horn on its underside near the big end, and to this is fitted a horizontal connecting link, the other end of which is attached to a swinging link pivoted to the motion plate. This swinging link is known as the *correcting* link, as it eliminates the error in the die block travel due to the horizontal movement (angularity, to speak in scientific terms) of the vibrating link which couples the correcting link to the die block and valve rod. It is this horizontal component of the motion of the connecting rod which causes the trouble, and as it cannot be eliminated first hand its effects are neutralised by the introduction of the correcting link which lifts the horizontal link (connecting link) the exact amount the vibrating link loses in length when it is standing on an angle to the vertical centre line of the motion.



FIG. 2.—MR. F. GREEN TESTS HIS HANDIWORK.

The weigh shaft is the same as used in the tank locomotive, and has circular guides (bored) and die blocks. The reversing arm provided in the casting must however be shortened for the "Precursor" locomotive, owing to the relatively low centre of boiler employed in this engine.

The crank axle is a mild steel forging with square webs, and as there are no eccentrics on this axle the journals and width of webs may be of ample dimensions. The axleboxes are standard with the Great Central locomotive (see full-page plate in our issue of August, 1909), and again, because there are no eccentrics, the length of the journals may be the larger of the two dimensions allowed in the drawing just mentioned. The slide bars and crossheads are the same as those described in the September issue.

The main frames are of  $\frac{5}{32}$ " best planished mild steel, and the footplates are of the same material, but  $\frac{1}{16}$ " (No. 16 standard wire gauge) in thickness. The wheels are correct L.N.W.R. pattern cast in iron from metal patterns, and have balance weights of proper shape placed in the proper positions. The boiler is of copper throughout, an excellent material for model  $1\frac{1}{2}$ " scale boilers, as not only does it provide against any deterioration, in use and in idleness, but it enables the designer to provide a *greater power* within the limits of space allowed. This is due to the fact that a steel boiler must—because of the rapid deterioration—be made of heavier plates than otherwise necessary, and therefore it becomes much "coarser" than a similar sized copper boiler. The outside dimensions being limited, this "coarseness" means that the firebox is smaller and consequently the flue tubes which can be crowded into the tube plate are less numerous. All these things go against the model with the steel boiler, although possibly almost as great a success can be obtained with a steel as with a copper generator, the model will not be so easy to hand, and will require more firing and attention generally.

The barrel of the boiler fitted to the model in question is a piece of 8" copper tube, having walls  $\frac{5}{32}$ " thick. The firebox is provided with cast girder crown stays, which the writer has used for the first time in a model, and which appear to be quite successful. Three gunmetal girders are employed, and the centre one is slung to the centre of the circular crown by ten straps or links pinned to a Tee-shaped casting riveted to the underside of the firebox wrapper plate. The smokebox castings are standard with the G.C.R. model locomotive, the hinge used on this line being very much the same as the type employed by the L.N.W.R. The locomotive is fitted with an injector, and the tender is designed in accordance with the official drawings of L.N.W.R. standard 3,000 gallon tenders, kindly supplied by Mr. Geo. Whale, the late locomotive engineer of that line.



### THE STEPHENSON SOCIETY.

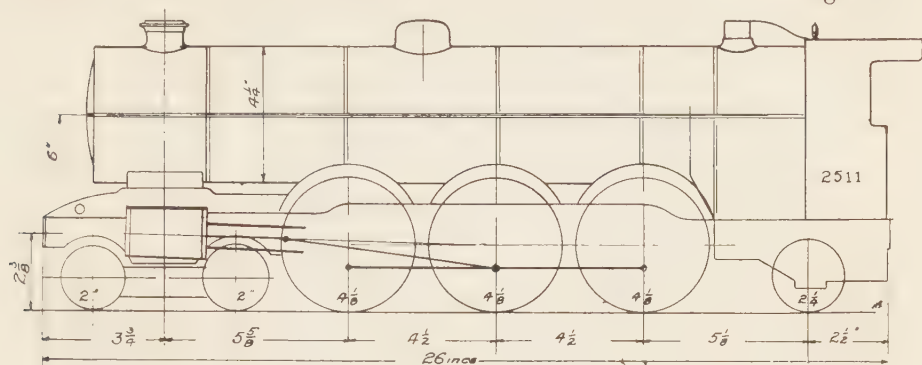
At a meeting held in Croydon on December 11th, 1909, the above-named Society was formed to further the interests of those following railway working, particularly as applied to the material side, namely, locomotives, rolling stock, and equipment. By the courtesy of the railway officials concerned, visits will be made to railway works, running sheds, etc. It is intended to meet and debate on all such matters of interest, to exchange ideas, and provide facilities for lectures, interchange of photographs, etc. The Stephenson Society proposes to be managed in as simple a manner as possible, that is without a heavy organisation and consequent high subscription. By carrying out these ideals in an efficient and, at the same time, a simple manner, the Society are able to keep expenses at a very moderate figure. The subscription is 5/- per annum, which will include a monthly copy of the Society's official organ, *Railway Notes*.

Further information concerning the Society and applications for membership may be obtained from the following officials of the Club :—G. F. BURTT, hon. sec., Kingmoor, Ringmer, Sussex ; L. E. BRAILSFORD, 92 Sydenham Road, Croydon.



### A SUGGESTION FOR AN IMPROVED MODEL G.N.R. No. 251.

CAPTAIN F. C. MOORE, who has a fine  $3\frac{1}{4}$ " gauge model G.N.R. "Atlantic," sends us a sketch of a "Pacific" designed on G.N.R. lines, which he suggests may be called "the last word" in  $3\frac{1}{4}$ " gauge model locomotives. We have traced it to scale, and should like our readers' criticism of the design both



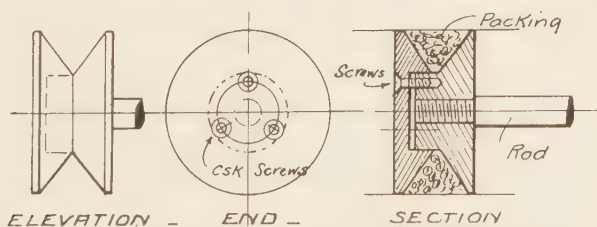
CAPTAIN F. C. MOORE'S SUGGESTED  $3\frac{1}{4}$ " GAUGE MODEL "PACIFIC,"  
DESIGNED ON G.N.R. LINES.

from a model and real standpoint. The writer has lately been in Southern Germany, and has had an opportunity of seeing the large locomotives of the Bavarian and Baden State Railways at work. These locomotives, although they strike the observer as being very large, are, when dimensions are compared with our English locomotives, really bigger than they look.



### A NOVEL PISTON FOR MODEL STEAM LOCOMOTIVES.

The difficulties of packing in a satisfactory manner the piston of a model locomotive or other working steam engine are well known, and I therefore send a suggestion for a new form of piston which should overcome some of the troubles model makers experience in this direction. The piston head is



made in two halves as shown, and to pack the piston, unscrew for a short distance the three screws in the back portion, then wind on the packing in the groove, and put piston and packing back into cylinder, then screw the three back screws and put on back cylinder cover. The drawings should make it clear to your readers.

We have seen a similar device, which the user claimed to be quite successful.—THE EDITORS.

## THE HISTORY OF THE MUDDLE-PUDDLE RAILWAY.

BY THE "MUDDLE-PUDDLE BROTHERS."

THE main line of this model railway was laid in September, 1903, but since then it has been enlarged and extended in both directions. It is now 80 feet long, in the shape of an elongated U, and in addition to this there are also 80 feet of sidings and platform roads. There are six stations, two larger termini and four small "road-side" stations. They are named in a peculiar manner, as may be observed in the following descriptions:—

*Rumtifoo*.—A terminus comprising two main platforms and a bay and seven roads of siding on the principle of the grid-iron. The buildings are large, and there is a working clock and a glass roof.

*Bungalee Boo*.—One platform and nine roads of sidings.

*Canoodle Dum*.—A wayside station.

*Muddle-Puddle Junction*.—One island platform and two roads.

*Spiffon-extra-Soofer*.—One platform only and a mail-taking apparatus.

*Titipu*.—A terminus with three platforms, five roads of sidings and a large station hotel.

The whole line is well signalled, and on one gantry there are four arms with indicators for three roads each underneath them: this arrangement saves using twelve arms.

All locomotives are worked by clockwork, the gauge being  $1\frac{1}{4}$ ". They are all tank engines at present, these being found very convenient to handle. All the stations are large and commodious buildings, but the passengers are dull and distinctly leaden!!

The rolling stock consists of:—

One three-coach eight-wheeled corridor block train (home made).

One four-coach ditto ditto (bought).

One two-coach non-corridor block train (bought).

One ten-coach four-wheeled suburban block train (bought).

One mail van (bought) with net (home-made).

One dining-car (bought). One horse-box (bought).

One rail motor car, constructed at Rumtifoo works. It is 63 feet long, to scale.

The goods stock comprises a motor traffic van, two bogie wagons (home-made) and twenty-six other goods vehicles of various kinds.

The trains are usually limited to four bogie coaches, but on busy days and for heavy traffic (in the evenings!) as many as seven bogie coaches are pulled by one engine.

For economy's sake the lead-pulleys for the signal wires are made from the penny model airships which were sold in the London streets last Xmas. Each airship has three pulleys in them. For ventilators for the home-made coaches, hobnails are used. The finials on the top of signal-posts are made from the wooden spindles Hobbies Ltd. sell for fret-workers (No. 12 in their catalogue). The ends are cut off and sharpened, and they cost a penny each, and one makes two finials.

All the platforms are made of wood with a white edge, and are coated with glue and sanded with grey sand. This makes a good substantial-looking finish.

Small scale permanent way is used throughout: it is found to work up excellently, and the points are quite easy to make if one only has a little patience, a little file, and a little hacksaw. The whole line is ballasted with granite chips which were procured from a local coal merchant.



PHOTOGRAPHS ON THE MUDDLE-PUDDLE RAILWAY.

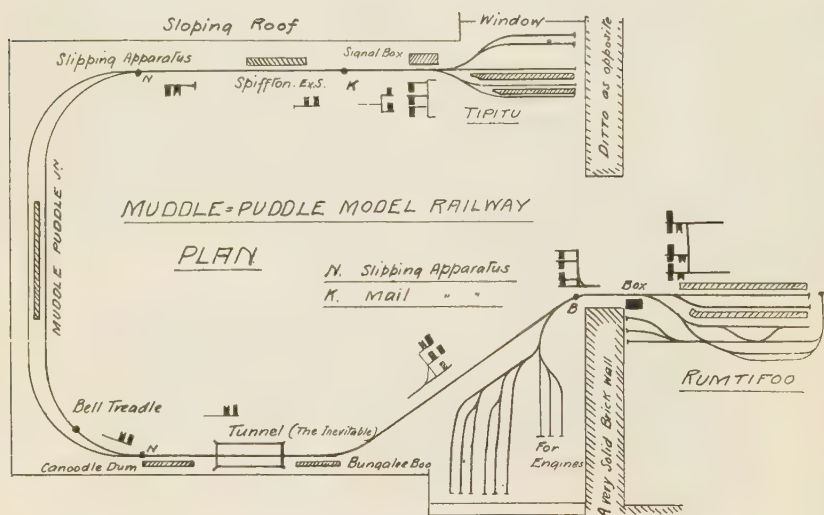
- (1) A home-made goods train, except for the engine and the brake van.
- (2) Titipu station.
- (3) "Loading the 12 noon express." The owner calls this a rather bad attempt at the realistic. The porters are naval men with rifles cut off, from a small size box of soldiers. They are 6' scale size—good strong porters!!
- (4) Rail motor car. This was cut out of wood with a pen-knife, which was found easier than a fretsaw. The "works" can be taken out altogether for cleaning purposes.

The locomotive works are intending to turn out for next year an "Atlantic" loco, and the engineering department will light all the stations with electric light.

The photographs, some of which are reproduced herewith, were very difficult to take, as the "district" served by the line is the "attic," but they perhaps give a better idea of the railway than this little history. The names of stations are not as "mad" as might be expected: they are taken from the "Bab Ballads," by W. S. Gilbert.

The mails are exchanged automatically, and the whole apparatus cost us very little. The coaches are slipped, and the train gives warning of its approach when it is passing Muddle-Puddle Junction by automatically ringing a bell in the signalbox at Rumtifo.

The construction of the mail apparatus is rather difficult for the writers to explain, but the sketches on the opposite page may help matters. The net is hinged to the side of the mail coach, and has a weighted arm inside, which is kept up by overbalancing weight of the bag to be dropped which hangs outside. When the bag is dropped and the net receives the other bag from the ground hanger or standard, the net by virtue of the weighted arm closes up and the incoming bag is delivered into the coach. The ground net has a hinged platform at the bottom, which, when set, holds the hanger across the track. When the bags are exchanged the platform falls and releases a coiled



PLAN OF LINE.

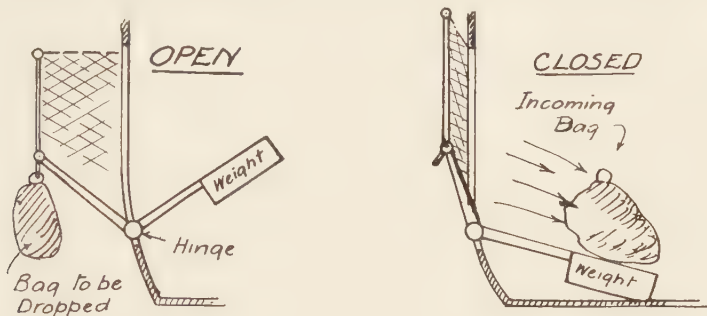
spring on the standard, which turns it round out of the way, as indicated in the sketch.

Here is an imaginary of one of the passengers who travelled by the 10 a.m. express mail ex-Titipu to Rumtifo, which train does not stop, but slips two coaches at Muddle-Puddle Junction :—

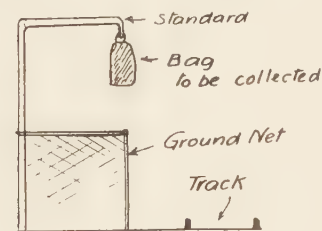
“We arrived at the station and found the train drawn up at No. 1 platform, and having claimed our seats in the “diner” and seen our luggage safely put in the guard’s van (all these details are quite true, as the luggage is made of lead—so are the porters!) we inspected the train. It comprised first a mail van with net, and the bags were being put in readiness. Then came the dining-car, next a corridor guard’s van, and after that a composite “brake third”—all corridor stock. Then at the rear were two composite coaches for the ‘slip.’”



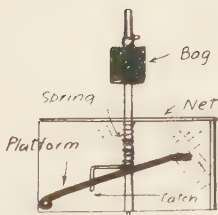
" During this time the train had been loaded, and the engine backed on. The signals were lowered—away we went. We rapidly gained speed, and passed Spiff-ton-extra-Soo-per, where the mails were taken (at 1'000923 miles per hour). We then accelerated, and rattled through Muddle-Puddle Junction at a good pace, slipped two coaches as the driver whistled. By the electric bell our approach was known at Runtifoo. We again quickened speed after the two coaches were dropped, and we passed the junction and roared



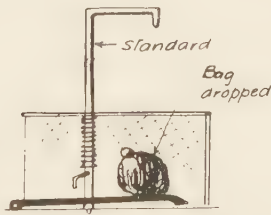
RECEIVING AND DELIVERING APPARATUS ON TRAIN,  
SHOWN OPEN AND CLOSED.



GROUND APPARATUS.



READY FOR MAIL  
TRAIN.



BAGS EXCHANGED AND  
STANDARD CLOSED BACK.

into Canoodledum Tunnel, which is 6'000 feet long. Then we slackened past Bungalee Boo and steamed easily into Runtifoo. We were up to time in spite of a slack just outside Runtifoo, arriving in the record time of 19 seconds, which represents a really very good run, considering what a dangerous journey it is!"\*

[\*The last paragraph sounds like Mr. C——J——A——N writing in the R———Y M———E.—EDITORS.]



## A GLIMPSE OF THE BRUSSELS EXHIBITION (1910) AND ITS MINIATURE RAILWAY.

To the artist and to the geologist I can heartily commend a saunter in the Exhibition grounds if he can muster up courage to run the gauntlet of complying with various formalities, besides personally encountering sundry functionaries of divers breeds, types and races; they will be rewarded in various ways, the foremost of which undoubtedly is the rich and varied gamut of tone-colours in mud, slime, slosh and ooze.

From the tender quasi-yellow hues of sandy descent obtaining in the amusement park to the sombre tintless blend of the spectrum, a mixture of ultra-violet and infra-red leavened with clinker, ashes and brick-dust, all conceivable tonalities are forthcoming in good supply and warranted to adhere to any superficial boot-area, be they twelves or fifteens! How Rembrandt, Jordaens and other kindred Hollanders would have rejoiced at this noble palette with its deep tints—deep in tone, and deep in depth,—if I may be allowed this “bull.” Any foot can sink eighteen inches at the first flop, and here begin the joys of the geologist, as with critical eye he views the different strata thus revealed to his wondering gaze and points with sapient finger to the various jurassic, pleocene and quaternary periods laid bare by the mighty trudge of some robust Flemish navvy.

The main entrance to the Exhibition is lower than the grounds proper, and a series of ramps bring the public up to the gardens stretching in front of the imposing façade of the Belgian section, with its fine row of Corinthian columns and dignified frontage. Part of this is completed already, and the general effect of this colonnade with its gilt capitals and imitation marbles will at once give the visitor a high idea of Belgian artists and their handiwork.

Round these gardens various structures are in course of erection, and naturally make it difficult for the profane eye to judge of the beauty or future destination of the construction by the size of a beam or the rivet-holes in the girders. They will however certainly be conducive to the general harmony of this—shall we call it “place,” “piazza,” or “platz”—if only crowding can be avoided: here lies the peril. On the left of the façade, old Brussels with its quaint streets and o’er-topping houses will provide lovers of “atmosphere” on the cheap with local colour to their heart’s content, always taking into account the ground tonalities and their geological strata. On the right is the exquisite building of the Ville de Bruxelles, a perfect jewel of pure style as typified in the finest structures in Flanders; further on we see an endless vista of scaffoldings, roofs and girders, domes, towers, minarets, steeples and spires, till far away in the distant horizon the vision ends with what resembles some Chinese house with its upturned roof-corners and, by it, a simulacrum of the branch-office of a Hindoo temple with its truncated monoliths and semi-pyramidal body.

Entering the façade by a flight of temporary steps, which each bears the imprint of different soils as each layer comes off the boot, we dodge carefully amongst shunting goods trains pushed about by quaint little outside-framed inside cylindered side-tank engines, provided with the deep-toned Caledonian syren with which the Belgian State Railway seem enamoured

at present, and find out that *mirabile dictu*, wonderful to relate ! the British section is ahead of others in preliminary work.

Here and there can be seen the vanguard of foreign installations, in the way of fierce-whiskered, baggy trousered French "ouvriers," dapper, well-fed German workmen hurling gutturals at each other and apparently thriving on their, now, celebrated diet of cat's meat and black bread ; further on, and one might almost say constantly, the good-natured stone-crushing idiom of the Belgian labourer impregnates the air as a Wagnerian leit-motive. And then, wafted by the breeze, and the smoke and the steam of those preposterously fussy little engines, come the sounds of a few syllables of subdued Billingsgate which made my British heart leap. No language in the world can convey the intense poetry, conciseness and force as can this simple phrase, "'Ere, Bill, where's that ——— 'ammer !" French would lack energy, German rapidity, Italian forcefulness, Spanish directness, and Russian—well in Russian I should imagine it to sound as the firing off of the grand set-piece at a Brock's benefit with, in the back-ground, a standard-size Yankee railroad smash-up !

Emerging from the building by some other "porte," we follow a fairly wide avenue, ornamented (?) on each side with structures which eventually will be devoted, apparently, to the cult of gormandizing, if we can judge by the inscriptions on the porticoes. Innumerable brands of beers, champagnes, etc., together with familiar brands of beef-teas, will no doubt promote universal good-fellowship, pending general disarmament.

We certainly do not expect in an avenue of this kind, symmetry of architecture, or unity of style, but the man who allowed to be stuck together, cheek by jowl, a fantastic rococo-Renaissance house next to an almost English Perpendicular structure ought to be murdered. I am a peaceful law-abiding, convention-respecting citizen, but I say so, and he richly would deserve it.

Crossing over a road by means of a ferro-concrete bridge, we land in a new coloured slime, bordered on the left by the continuation of the main building, the acreage of which seems beyond computation, on the distant right by the lavish display the German section is making, and on the immediate right by the elegant and tasteful building erected by Holland.

Opinion will no doubt be divided on the pleasantness of this German affair, certainly "Kolossal" if anything. Plain white low walls, surmounted by a wavy expanse of dark slate roofing, the whole modestly overtopped by a metallic symbol of the world, merely, is a scheme open to discussion, to say the least of it. To add to the local colour and make you feel quite at home, sundry notice-boards in divers places remind the trembling on-looker that many things in this world are "verboden," chief amongst which is going near the place. So, with a feeble "hoch !" we wend our way through different thicknesses and styles of portable geology, and, returning over the road by another bridge, reach the amusement grounds.

Here our trans-Atlantic cousins certainly shine, in their own way, for the quantity of gut-wracking, tripe-twisting "gravity-rides" is an admirable monument to their fecund imagination and sense of humour. The moral of their lay seems to be : Make a man feel as much as possible that he is going through a railway accident during an earthquake, and he will be never so happy ! Fearful and wonderful "daddy-longlegs" kind of structures, surmounted by the triumphant Stars and Stripes, project boldly against the sky in all directions. Fantastic dips, huge humps, break-neck ascents and descents meet the enquiring eye in all corners. People will be whizzed,

shot up, dropped, ejected and vomited in no end of ways, much to their delight, no doubt, but woe betide the mere mortal who boasts not of a stout heart and a strong constitution with nerves of iron!

Modestly, unassumingly, but none the less smartly and elegantly, runs our little friend the miniature railway, amongst the turmoil of those wonderful contrivances, as a contrast to them, such a contrast as might be sung by a poet in alternate stanzas dedicated in turns to the praises of sweet Zephyr and blustery Boreas, or in common "flat-footed" parlance—a gentle refreshing summer breeze and a good strong nor'-wester of the main-mast-bending type.

Nestled down among the various structures we see the familiar 15" gauge "main line" laid and finished in a way which would be a credit to any crack English company, the sort of line on which the driver would feel inclined to "let her rip" for all she was worth; smooth, strong and springy, this latest line of the Miniature Co. seems the very acme of what is possible to do in narrow gauge permanent way, and those smart, business-looking little tracks seem to invite crowds unlimited to a "silky" ride along its straights and unimpeachable curves.

The line is a double one right through with a terminal station at each end of one platform; the trains will run on the left-hand track in the classic way, each starting from opposite stations at about the same moment. A neat and simple signalling arrangement has been devised to restrain any regrettable impetuosity on the part of those "crack expresses" in the shape of a starting signal to each platform, a home and a distant, all scale-model signals of course. A train standing in a station will be protected from an "almighty smash" in case it is delayed in starting, for train No. 2, before rounding the corner, which completely blocks the sight of either termini, will first meet his distant "on" and after the curve the home "on." If that does not do, the Company have arranged to provide the stationmasters with accurate rifles to shoot the drivers down first and the passengers after to prevent prolonged agony on the part of possible victims (no extra charge).

The stations will be neat little structures of gay design and finish, always as contrasts to the surrounding atmosphere and the arrangements for the public are so planned as to give the incoming passengers all convenience for getting out speedily without colliding with the hosts of enthusiasts pressing forward to take their seats for the next run out.

At each terminus, the line continues double, finishing into an engine length of single line to enable the locomotive to be detached, run round to a cross-over road outside the station and brought back to the train. This entails, naturally, engines running alternatively chimney in front and then tender in front—an innovation in miniature working not perhaps precisely designed by the company, but, under the circumstances, unavoidable, as turntables would have presented dubious points to say the least of it, besides entailing a great waste of time and energy.

Three engines, constructed by Messrs. Bassett-Lowke, of London & Northampton, respectively named "King Leopold," "King Albert" and "King Edward," will compose the loco. stock of the Brussels Miniature Railway, construction being therefore at present at high pressure in order to be ready betimes for the 23rd April next, date at which the Exhibition is due to throw open its doors to the public.

We reluctantly leave our little friend as in sheds, and along the line the air resounds with the hissing of saws, the clanking of iron and thump of



ballast-rammers, the whole carried on, in the usual international exhibition style, amidst conversations and orders issued in various languages and, strange to say, understood by all the individual atoms in those polychrome crews, and literally girding up our loins vigorously, we ascend sundry banks of evidently recent geological formation, passing on to another bridge which re-crosses the main road. Poetically resting up against its rustic parapet, we give one more parting glance at the miniature and its fine steel threads disappearing in the distance, gradually merging into immaterial cobweb, or, as the French gracefully put it, *fil de la Vierge*. Inwardly expressing our wishes of hearty good luck to Mr. Miniature, and oppressed by sentiment and ecstasy, we narrowly escape falling flat on our face in the mud owing to the treacherous, because concealed, presence of a cube of concrete prepared there for some steel column: we had in fact wandered into a building *in posse* inadvertently: such mistakes will happen.

The Belgian sun was making a bee-line for the horizon; we imitated his discretion and decided to gracefully retire likewise. We started, struggled and won, after having been duly compressed, harmlessly however, between a wall and a casual goods train which "happened" just then and there. In we popped into one of those dapper little green Brussels trams, and in due course regained the jovial atmosphere of the Boulevard Anspach and the Place de Brouckère.

L. H.

Brussels, March, 1910.



### L.N.W.R. SHUNTING SIGNALS.

WE have noticed that the London and North-Western Railway is abandoning the purple glasses in the subsidiary semaphores and ground discs that have hitherto been so fitted in the southern division, which included the London area. Several in the neighbourhood of Willesden, Camden and Loudoun Road have recently been altered, while others are now being changed. In the case of the semaphore arms, the purple glass, hitherto used for the "stop" indication, has been taken out, and the usual red glass inserted in its place, leaving the green as the "all right" indication. Those ground disc signals which formerly had a purple bull's-eye are now fitted with a white bull's-eye of approximately the same size. The latter alteration, our contemporary *The Railway Club Journal* remarks, seems rather a needless change, for it is extremely doubtful if the purple light was ever mistaken for red or that it was found too brilliant. However, if a change was deemed necessary, would it not have been better to have either had a blind signal—*i.e.*, showing no light at night in the "stop" position—or, if a light was desired, a small bull's-eye similar to the back light usually employed by most companies? There is, perhaps, more to be said in favour of the substitution of the red for purple in the semaphore arms, for all starting signals controlling passenger roads are practically of equivalent value, and the colours simply serve to distinguish between the signals for the through running roads and those for the bays or subsidiary lines.





## ELECTRIC POINTS AND OTHER MATTERS.

TO THE EDITORS *Model Railways and Locomotives*.

DEAR SIRS,

Since writing the article on the "Muddle-Puddle Railway," I have ideas not all my own for fitting automatic electric points. It will be seen that at Muddle-Puddle Junction that there are two points which could be advantageously worked automatically, and so I intend to put a treadle at each side of the junction which will at the right moment switch on current and move the points. While thinking out this rough idea it occurred to me that if a wrong road shunt is required the operator has only to put his finger on the treadle, and hey presto! the points change over!

It might also cause some valuable suggestions to be published by asking correspondence on the following topics:—

- (1) Automatic electric points;
- (2) Automatic whistle on clockwork and electric engines;
- (3) Water pick-up apparatus for steam models;
- (4) Model pneumatic signalling.

I think in these there is abundant scope for originality and ingenuity, and such articles or letters would cause a great deal more interest than finding out the way to re-design a L.N.W.R. "Precursor" so that the coal bill might be reduced by a few ounces per mile—after the suggestion of your correspondent in the February issue.

Yours truly,

"ENGINEER, M.-P. MODEL RAILWAY."

## COUPLING POLES AND HOOKS.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I must congratulate you for having to move to more commodious premises. It shows that *Model Railways* are going full steam ahead, evidently with "line clear."

I feel that I would like to tell fellow readers of still another method of fixing the new style coupling hooks, which I think is the best of all. Fix hook firmly in the vice, and with a pair of pliers take out the existing twist, so that the whole is perfectly flat. Fix again in the vice (this time with the hook end protruding), put all in jaws up to within  $\frac{1}{8}$ " of the shoulder and give a right-angle twist. Then with a file take off the top and bottom edge (take plenty off) where it catches in the slot of the vehicle. A fresh hole will now have to be drilled in the bottom of the vehicle (this is quicker and better than drilling in the arm of the hook) and rivet up. You will find that the hook has a little side-play, which with a three-link chain enables the train to negotiate

the sharpest curve. If the hook does extend beyond the level of the buffers, enough can easily be filed off so that the buffers can touch. In the cases where I have altered the hooks in the way described I have found every young "superintendent of the line" most pleased with the result, and more particularly because the buffers of each vehicle will touch those of the next.

I was very sorry to see in the January issue that my shunting pole had "gone the way of all flesh" so soon. The one I have been using has followed suit. I am afraid the latest member of my running department of my railway (aged 3) is the culprit. I think your hook would be better with a cork-screw twist rather than a sharp angle. I will send you another one shortly, and you will see the difference. Wishing you continued success,

I am, yours faithfully,

FRANK ANGELL.

TO THE EDITORS *Model Railways and Locomotives*.

DEAR SIR,

With reference to your remarks in a recent issue *re* German railways. During a recent visit to Germany I had an opportunity of travelling in one of the new 2nd class Prussian State Railway sleeping cars attached to the Berlin-Cologne night express. These "sleepers" are standard bogie cars, and have accommodation for 20 passengers, and a compartment for the attendant, who runs a buffet. Each compartment measures 6' 6"  $\times$  5' 6", and has an upper and lower berth, folding table, folding lavatory basin, two electric lights, one blue night lamp, and special shaded lamp for shaving. A door leads into the next compartment if required. The fitting up is equal in every respect to the 1st class cars in this country. The price is 8/- per night above our 3rd class fare. Surely it is time our railways woke up and gave the public something cheaper than 1st class plus 10/- for sleeping accommodation.

Yours faithfully,

London.

Traveller.

### ANSWERS TO CORRESPONDENTS.

C. G. B. (Southport).—The height of the boiler in the super-elevation formula should be measured from rail-level, and the gauge of the rails in ordinary cases should be the exact distance between the rails on the curve, which may of course be larger than on the straight. Like all other engineering formulæ, it should be used with care and in a common-sense way.

W. R. S. S.—Thanks for drawing.

R. R. (Hartburn).—Photos are not large or sharp enough for our purpose.

E. G. H.—Your photographs are hardly clear enough for reproduction.

R. J. Purves.—Many thanks for the excellent N.E.R. photographs. We had already made arrangements for this issue.

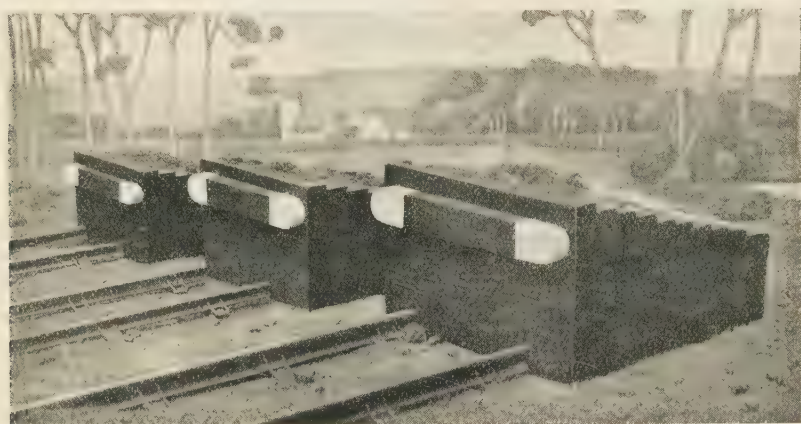
G. F. (Fife).—Much interested in the photographs of your model railway taken during the snowstorm. Pity they are so much underexposed.



### MODEL BUFFER-STOPS—OLD STYLE.

Of types of buffer-stops their name is legion, but for picturesqueness the old type "dead end" consisting of a palisade of sleepers filled in with earth is hard to beat. In our railway wanderings we have noticed various sorts even of this type, some decrepid, bent with age and covered with lichen, and some bound round with hoops in the hope that they may be kept together.

The accompanying photograph shows a series of miniature reproductions of more respectable examples, which although old-fashioned, have some



claims to uprightness. The set in the picture represents stops made to Nos. 0, 1, 2 and 3 gauge standards. They are made up of separate sleepers, finished in dead black and "earthed" on the top. The buffer-plank is tipped with white, so that there should be no excuse of not seeing the stop, by the model "engine-driver," for bumping up the train rather heavily into the dead end.



### READERS IN DIFFICULTIES.

#### DIFFICULTY No. 70.—No. 0 GAUGE RAILWAY PLAN.

J. I. C. (Swindon) writes :—I wonder whether you could advise me on what would be the most *interesting* No. 0 gauge system to lay down in a room measuring 16' by 11' ? The door is no obstacle : I can get it hung outwards. I may say that I shall use the new radius curves everywhere (tin-plate). Do the No. 0 gauge lengths lend themselves to anything like the system on page 47 of the *Model Railways Handbook* ? How far could I copy that ? I have some of the heavy "Jupiter" engines, and want them to show off to the best advantage.

In reply to your enquiry, there should be no difficulty in setting out a plan like Fig. 46, page 47, in our 6d. handbook, the chief difference being the number of pieces in a circle. The No. 0 gauge large radii circle contains 12 pieces against 16 pieces of the No. 1 gauge, and it will be noted the presence of a pair of points in the circle does not, as in some gauges, require a half-length to make up the complete track. The curved rail of the points is the same length as a standard piece of curved rail. Other features of the plan are obtainable in No. 0 gauge as in No. 1. Do not lay down on the main line any of the points and crossings which are only obtainable in the small radii.



## DIFFICULTY NO. 73.—MODEL SIGNALLING.

J. C. S. (Cambridge) writes:—I am in rather a difficulty over signalling a model junction I have made. Also would you show me any alteration which you think would be an improvement.

Your plan appears to transgress some of the canons of railway practice. However, we have shown it signalled to the best of our ability, leaving out all distant signals, which we submit are often really unnecessary in model railway work. They serve no useful purpose where stop catches are employed, and run up the cost of a model railway system to an

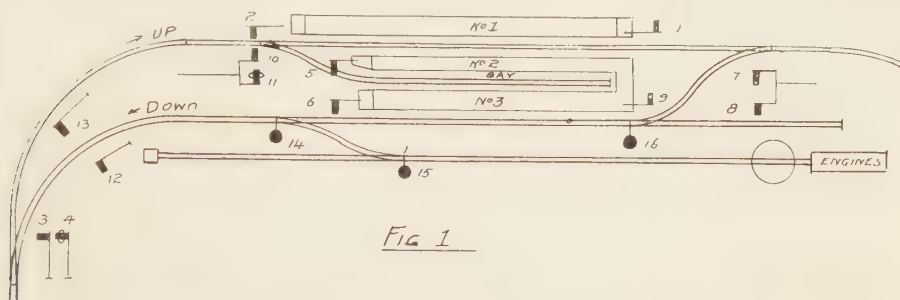


Fig 1

## Key to Signals on Figure 1.

- |                                  |                                      |
|----------------------------------|--------------------------------------|
| No. 1.—Up starting signal.       | No. 9.—Down backing signal.          |
| " 2.—Up backing-out signal.      | Nos. 10 and 11.—Station home signals |
| " 3.—Up junction-home.           | for down and bay roads.              |
| " 4.—Up-to-down junction home.   | Nos. 12 and 13.—Advance signals to   |
| " 5.—Bay road starter.           | protect junction (a regrettable      |
| " 6.—Down starter.               | necessity).                          |
| Nos. 7 and 8.—Down junction home | Nos. 14, 15 and 16.—Ground discs.    |
| signals.                         |                                      |

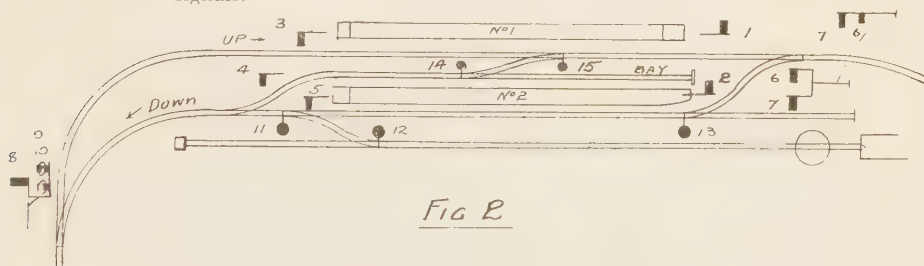


Fig 2

## Key to Signals on amended plan Figure 2.

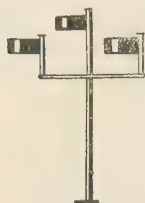
- |                                |                                  |
|--------------------------------|----------------------------------|
| No. 1.—Up starting signal.     | No. 7.—Down station home.        |
| " 2.—Down backing-out signal.  | " 8.—Up station home.            |
| " 3.—Up                        | " 9.—Up main to bay road.        |
| " 4.—Bay road starting signal. | " 10.—Up main to down platform.  |
| " 5.—Down road                 | Nos. 11, 12, 13, 14 and 15.—Disc |
| " 6.—Down to No. 1 platform.   | signals.                         |

alarming extent. You do not say whether the trains only run in one direction. We have signalled the line for both directions. If we can offer any improvement it would be to make the bay road lead on to the down line of the loop. This will alter the signalling as shown in the second sketch. In the amended plan (Fig. 2) we have added a crossover line, which leads from the up main line to the bay road, and is controlled by one or two disc signals (Nos. 14 and 15).

For ordinary working, where the shunting of trains in the station is not required to be controlled by semaphores, the signals Nos. 2 and 3 may be dispensed with, and No. 6 may be a short arm below No. 7 on the same post, as shown in alternative sketch; or if a drastic reduction must be made, Nos. 2, 3, 10 and 6 may be omitted, and also the crossover Nos. 14 and 15.

## DIFFICULTY No. 54.—DISTANT SIGNALS.

F. H. (Farnham) writes :—I have placed three home signals on a bracketed post, one for a siding, one for the main line, and one for a bay road. Do I need three arms on the distant, or will one suffice ?



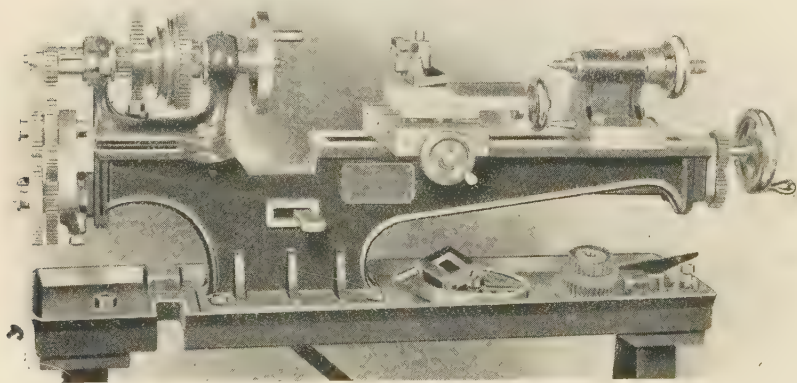
DIFFICULTY No. 54.—ARRANGING DISTANT SIGNALS  
FOR THREE-ARM HOME BRACKET SIGNAL.

Strictly speaking, the arms should be repeated, but everything depends on the local circumstances. For model purposes we should only fit one distant, and should connect it so that the pulling off of either home signal will simultaneously put the distant at line clear and incidentally move the brake-stop. There are many methods of accomplishing this.

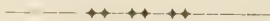


**MESSRS. DRUMMOND BROS., LTD.,  $3\frac{1}{2}$ " BACK-GEARED  
SCREW-CUTTING LATHE.**

WOULD BE purchasers of a foot lathe will do well to note that Messrs. Drummond Bros., Ltd. are now fitting their well-known  $3\frac{1}{2}$ " centre lathe with a compound side rest without any extra charge. We append a photograph showing this useful addition to the already excellent tool.



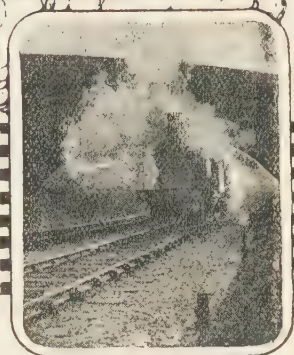
It will be seen that the Tee slotted boring table travels transversely on the cross-slide, easing the setting and increasing the usefulness of the lathe for milling and boring jobs. The upper slide swivels completely round and is graduated in degrees. The size of the **T** slotted surface has also been increased in its length across the lathe.



All communications with respect to this journal should be addressed to *Model Railways and Locomotives*, at the new office, No. 112 High Holborn, London, W.C. We cannot guarantee attention to letters and orders addressed otherwise.

# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 5.

MAY, 1910.

## BETWEEN OURSELVES.

WE Editors are a strange and peculiar race of beings, and receiving everything that is sent us—grumbles, praise, copy, photographs—we bundle the whole into a basket until we find it is past the proper time to make ready the next issue. [The *next* issue is always the feature of an editorial sanctum.] This being the case, when we come to sort things out, we have difficulty in telling "t'other from which" unless the name of the illustrious author is written on the back of every document and drawing. Contributors kindly note!

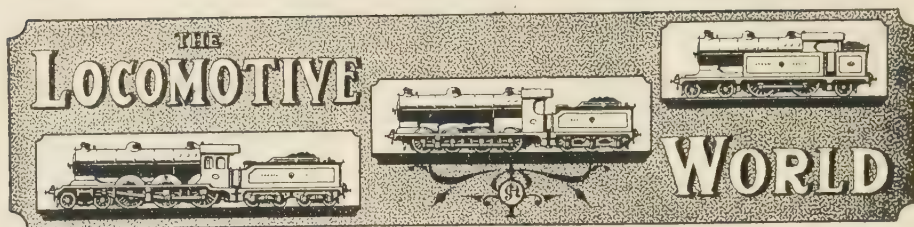
We beg to draw the attention of our readers to the paragraph in the last issue with reference to the reprinting of the January 1909 issue, and await more postcards.

For some time past we have experienced difficulty in getting our journal into the hands of our readers in the provinces through the usual channels of newsagency, and have not been in the position to alter the condition of things at once. We are now able to announce that the whole of the wholesale distribution—or publishing, to give it its proper name—has been placed in the hands of the Aldine Publishing Co., Ltd., Crown Court, Chancery Lane, W.C. This firm are well known to all newsagents, and have an excellent distributing organisation. Our old friend, Mr. J. Birch, the publishing manager of the "Aldine," is giving the business his best attention, and we hope for great improvements in the distribution as well as in the numerical circulation of the paper.

## CASSIER'S MAGAZINE.—THE SPECIAL RAILWAY NUMBER.

THE publishers of this magazine (Louis Cassier Co., Ltd., 33, Bedford Street, Strand, W.C.) have kindly placed a copy of the special issue at our disposal. Although for twenty years we have been collecting locomotive literature, we cannot remember anything approaching it in both point of size and excellence. We would have liked to enumerate all its features, but space forbids. The leading article on the British locomotives is by no less an authority than J. F. McIntosh, the Caledonian Railway Superintendent. Among other important articles are contributions by influential men in their respective spheres on:—Modern high-speed locos of America; the development of the electric locomotive; railway signalling in America; power signalling; Continental locomotives, oil burning locomotives, etc. The issue is printed on art paper, and exceedingly well illustrated. The price is 2/6 nett.





## THE EXPRESS LOCOMOTIVES OF THE NORTH-EASTERN RAILWAY.

BY CECIL J. ALLEN.

*(Continued from March and April issues.)*

THREE years after the construction of the S1 class—that is, in the year 1903—it became necessary to design a type of locomotive for the working of the East Coast Joint services with equivalent power to the largest express locomotives then at work, but a greater reserve in the matter of speed, and for this purpose the “Atlantic” type was resorted to, the resultant V class representing the most extreme limits of construction possible under the restrictions imposed by the British loading gauge. The first engine of this type—No. 532—left Gateshead Works on Nov. 3rd, 1903, and, on account of its prodigious proportions, was forthwith christened, by force of contrast, the “Gateshead Infant.” Ten of these engines are at present at work, and are to be added to shortly by a further series of ten now under construction, known as class VI, of which the main proportions will remain unaltered, save for a reduction of  $\frac{1}{2}$ ” in the diameter of the cylinders. These locomotives are characterised by several remarkable constructional features.

Chief among these is, of course, the boiler. This has a diameter of 5’ 6”, and is pitched at a height of 8’ 11” above rail level, with a result that the boiler mountings have been reduced to a minimum in size only rivalled by those of the “Atlantics” owned by the North British Railway. In this connection I think it only fair criticism to remark that had the designer made the dome a little less of a “pudding” in shape, that is to say, more rectangular in elevation and more in harmony in size with the chimney and enormous safety-valve casing, the appearance of the engines would have been greatly improved. However, that is by the way. The chief advantage of the “Atlantic” type is found embodied in this design, that is, the large firebox that it becomes possible to arrange between the frames when there are no limitations in its form caused by the presence of a coupled axle at front and back. In these engines the firebox is 9’ 0” in length, providing a grate area of 27 sq. feet. Even this large area, however, is less by 4 sq. feet than that of the standard Great Northern “Atlantics,” the fireboxes of which, although shorter, gain considerably in width at the grate level by being of the Wootton pattern.

As regards dimensions, the boiler and firebox provide a total heating surface of 2,456 sq. feet, the working pressure being the usual N.E.R. standard of 200lbs. The cylinders are of noteworthy dimensions, being 20” in diameter by 28” stroke, an extreme limit in size when compared with the 18 $\frac{3}{4}$ ”  $\times$  24” of the Great Northern “Atlantics.” Piston-valves of Smith’s patent segmental type are fitted. The driving wheels are 6’ 10” in diameter, at 7’ 7” centres, and they sustain an adhesive weight of 39 tons. The bogie wheels



are 3' 7 $\frac{1}{4}$ " diameter—the N.E. standard in all modern locomotives save those of the R1 class—and the trailing carrying wheels 4' 0" diameter. The total wheelbase is 28' 0", and the total weight of engine in working order 72 tons. A large six-wheeled tender is provided, with a capacity for five tons of coal, as usual, but in this case 4,125 gallons of water. The total weight of engine and tender in running order reaches the high figure of 115 $\frac{1}{2}$  tons.

The compound system, which has pursued a retrograde course on the North-Eastern Railway during Mr. Wilson Worsdell's *régime*, since he had converted very nearly all Mr. T. W. Worsdell's compound locomotives to simples, and had only constructed one compound himself—No. 1619—now came into prominence in 1906, with the construction of the two largest compound locomotives ever built in Great Britain. These are four-cylinder balanced compounds of the "Atlantic" type, and are numbered 730 and 731.



Photographs by]

Four-coupled (Class R) Locomotive.

[R. J. Purves, Gateshead.

One of the four-cylinder compounds.

#### N.E.R. EXPRESS TRAINS NEAR NEWCASTLE.

They have a longer wheel-base than any locomotive now running in the British Isles, saving only the "Great Bear," viz., 28' 9", although they are closely approached by the Caledonian "Cardean" class with 28' 8". This length of wheel-base is principally due to the fact that all four cylinders are arranged in line under the smokebox, and drive on to the leading coupled axle. The high-pressure cylinders, which are arranged inside the frames, are 14' 4" in diameter, and the outside low-pressure cylinders are 22" in diameter, all having a uniform stroke of 26". The four cylinders are actuated by two sets of valve-gear only, that in the case of No. 730 being a modified form of Stephenson's link motion, and in No. 731 a modified Walschaert gear.

The driving wheels are of a larger diameter than those of the simple "Atlantics," viz. 7' 1 $\frac{1}{4}$ ", but the bogie and trailing wheels remain respectively 3' 7 $\frac{1}{4}$ " and 4' 0" diameter as before. A noteworthy external feature is the long splashers running from the cylinders right back to the cab, and clearing the coupling-rods, this having the effect of imparting a curiously characteristic "ironclad" appearance to these engines. The boiler is of reduced diameter

as compared with the V class "Atlantics," 5' 0" as against 5' 6", and is only pitched 8' 10" above rail-level, allowing more slightly boiler mountings to be fitted. For the first time in the history of the North-Eastern Railway the Belpaire firebox has been employed in this design, affording a grate area of 29 sq. feet. The heating surface totals 1,962 sq. feet, and the working pressure has, in this case, been raised to the high figure of 225 lbs. per sq. in. The tractive effort exerted by these engines is one of 17,539 lbs. The coupled wheel-base is one of 7' 6", sustaining an adhesive weight of  $39\frac{1}{4}$  tons, while the total weight of engine is  $73\frac{1}{2}$  tons. The total weight of engine and tender, the latter having a capacity for 5 tons of coal and 3,800 gallons of water, is in working order one of  $116\frac{1}{4}$  tons.

A lapse of three years took place before another new locomotive type made its appearance on the North-Eastern Railway, but last year the locomotive department, still apparently continuing the policy of the experimental in design, and temporarily forsaking in this instance both the 4-6-0 and the 4-4-2 types, renewed its allegiance to the 4-4-0 type and turned out a series of ten locomotives ranking among the very largest locomotives of this wheel arrangement now running in this country. For the first time in British locomotive history a 5' 6" diameter boiler was fitted to a 4-4-0 locomotive, excepting only the experimental boiler of this size which was carried by a Great Western 4-4-0 engine—No. 3297 "Earl Cawdor"—for a brief period. As with the simple "Atlantics," the boiler being pitched at 8' 11" from rail-level necessitated the employment of the same diminutive boiler mountings, although giving the locomotive an extraordinarily massive appearance for its length. The heating surface totals 1,737 sq. feet, and the high pressure of 225 lbs. per sq. in. employed on the compound "Atlantic" locomotives is also the working figure on these powerful machines. The area of the fire-grate, which is of the exceptional length for a 4-4-0 engine of 9' 0" the same as on the simple "Atlantics," class V, totals 27 sq. feet.

The cylinders have the moderate dimensions of 19" diameter by 26" stroke, and are, as usual, operated with piston valves. The driving wheels are 6' 10" in diameter, spaced at no less than 9' 6" centres, and carrying the high adhesion weight of 42 tons. The bogie wheels are 3'  $7\frac{1}{4}$ " in diameter, the total wheelbase is 22' 9", and the total weight of the locomotive in working order is  $59\frac{1}{2}$  tons. The pattern of tender carried by the large "Atlantics" is also supplied to these engines, the weight of engine and tender in working order being one of 103 tons. These engines undoubtedly mark the attainment of the maximum limits of development possible in this country, under the present loading gauge restrictions, of the 4-4-0 type of locomotive, just as the V class "Atlantics" marked that of the 4-4-2 type, and their efficiency in working the fast and heavy express trains of the North-Eastern Railway as compared with the smaller 4-4-0 locomotives of the R class, the 4-6-0 express locomotives, and the simple and compound "Atlantics," will doubtless be watched with great interest.

One of the principal features of the North-Eastern locomotive stock is the commodious type of cab, with side windows, which is fitted to all locomotives, and which has justly earned the lifelong gratitude of all N.E. enginemen. This owed its introduction, together with the other general characteristics of the engines of the line, to Mr. T. W. Worsdell, appearing for the first time on the two 2-4-0 locomotives of class D, which constituted his initial design. At the time of the introduction of such shelter for drivers the North-Eastern Railway stood alone in the country in this respect, but

this excellent example has since been largely followed by the Great Eastern and North British Railways, whose roomy "houses" for their men are now beyond reproach. The cab roof of the later N.E. large-boilered express engines is arched very considerably in order to afford a good look-out in front.

Another noteworthy feature is the employment on all the modern engines of a combined variable blast-pipe and ash-ejector, designed with a view to relieving the back-pressure on the pistons, and emptying the smokebox of ashes. The driver is able to regulate the blast on the fire, and, when taking heavy gradients or starting, a valve at the bottom of the blast-pipe is opened, and has the effect of increasing the blast-pipe orifice from  $4\frac{3}{4}$ " to  $7\frac{1}{2}$ ". Thus the amount of ash drawn through the tubes is reduced to a minimum and wastage of steam is prevented. The North-Eastern Railway is one of the few important lines in this country employing the Westinghouse brake, a



*Reproduced from*

*[Railway Notes.*

N.E.R. CLASS V "ATLANTIC" PICKING UP WATER NEAR NORTHALLERTON.

number of the more powerful express engines being fitted with the "quick-acting" variety. On account of the Great Northern Railway, one of the partners in the East Coast route, employing as standard the Automatic Vacuum brake, a large number of North-Eastern engines are dual fitted, being supplied, however, with the combination valve and gear for using both brakes in conjunction. A large number of express engines on this line are also fitted with patent gear, working from the line in connection with the signals after the fashion of the automatic reversing apparatus on model tracks, for shutting off steam automatically and blowing the whistle to attract the driver's attention when the line is not clear.

Externally North-Eastern locomotives are finished in a particularly handsome fashion, the colour employed being a bright green with black edge, and fine white lines, while the "Atlantic" locomotives also boast the additional decoration of fine gold lining. Their appearance is still further enhanced by the polished brass chimney caps, safety-valve casings, beadings to splashers, cab windows, &c., which give the engines a very smart finish. Generally speaking the graceful and characteristic external lines, coupled with the general simplicity of design of the modern types of North-Eastern locomotives described in this article, render them especially suitable subjects for reproduction in miniature, and great favourites with the model engineer.



In conclusion, I must plead the interest involved in a description of the express locomotive stock of a line possessing 410 express engines of no less than twenty-two different types in all as an excuse for the somewhat inordinate length of this article.



### WATER-TROUGHS.



THE ingenious inventor who devised the now almost universal means whereby a locomotive replenishes its supply of water on a long non-stop journey probably little thought of what a revolution in railway travel would result from the employment of this simple idea. He was at that time the locomotive superintendent of the London & North-Western Railway, by name Ramsbottom, and it is fitting that this line should hold the world's record for long distance running without intermediate stoppage, having on several occasions worked special non-stop trains between London and Carlisle, a distance of 299 miles. On this length of line will be found nine sets of track water-pick-up troughs—at Bushey, Castlethorpe (near Wolverton), Rugby, Tamworth, Whitmore, Moore (near Warrington), Brock (near Preston), Hest Bank (near Lancaster), and Tebay. The importance of this system of taking water will be realised when it is mentioned that without its aid the 100-mile non-stop run becomes practically an impossibility, owing to the enormous water capacity required in the tender.

For instance, on the longest daily non-stop run in the world—by the Cornish “Riviera, Limited” express of the Great Western Railway from Paddington to Plymouth, 225½ miles—some 4 tons of coal are consumed against about 40 tons of water, the carriage of which would be equivalent to the weight of a twelve-wheeled 65' 0" dining-car, a proceeding economically out of the question. Even now the only lines still without water-troughs on their respective systems are obliged to equip their express locomotives with large eight-wheeled double-bogie tenders; the London & South-Western and Caledonian are the two most important left of these, although the practice also obtained on the Midland Railway until the fairly recent introduction of troughs. Every other line of note, however, boasts several sets of track troughs, the total number now installed in this country—the only country where they have been seriously adopted—exceeding fifty. The advantages of laying track water-pick-up troughs, however, are not confined only to the length of run that is permissible by their use. Another very great advantage is that of being able to supply the locomotives with water at a spot where it is good and cheap, instead of their being compelled to take water—possibly of an inferior quality—at the stations where the trains are booked to call.

Several preliminary points about the laying of the troughs are, of course, essential. The line must be perfectly level, or the water will run out of the troughs at one end. The spot selected must be one with an abundant supply of water close handy, and requiring as little pumping as possible, while the water must also be of such quality as to require no special treatment for use in locomotive boilers. The troughs must also be laid well clear of all signals, so that there shall be no hindrance whatever to the trains passing over them at the speed requisite to taking water by this means—having a minimum, by the way, of about 30 miles per hour. The principle of their use will of course be well-known to almost every reader: a shallow trough, a few inches deep only, is laid in the “four-foot way” for about ¼-mile, and filled with water: the tender of the locomotive is fitted with a movable



shovel-shaped appliance called a "scoop," connected directly with the tender water-tank; on reaching the troughs at full speed the scoop is lowered, and its sharp edge cutting off the "top layer" as it were, of the water, forces it up from the trough through an inclined pipe into the tender. In this way some two or three thousand gallons of water may be picked up in ten or fifteen seconds at a good speed.

The troughs are made of galvanized sheet steel, roughly 6" deep and 1' 6" wide, and are laid absolutely level. The older patterns were laid on longitudinal timber baulks, which rested upon and were notched into the sleepers; but the latest patterns of troughs, as used on the Great Western Railway, are carried on light bent steel frames fixed to the sleepers, a much cheaper and better form of construction. The only advantage of the former method is that it is a greater protection to the bottom of the troughs against frost, but this is not a serious matter on lines where the train service is frequent, as the trains then cut up the ice as soon as it appears. The newer troughs are also fitted with a turned-in lip on either side, to minimize, as far as possible, the wastage of water. A capacious reservoir water-tank is connected with each set of troughs, and is fitted with a large and very sensitive type of ball-valve, controlling the flow of water to the troughs through an equilibrium valve, also of large size to ensure the troughs filling rapidly again after the passage of trains, between which the interval may be as little as five minutes.

For a length of roughly sixty yards at one end of the troughs the metals dip down on to them, rising out of them at the further end over a similar distance. This is to obviate the possibility of the scoop fouling the troughs or permanent way in any way, should the driver lower it too soon, or fail to raise it in time after having taken water, and it is by this means dipped bodily into the trough by the forward motion of the engine, and similarly raised out at the further end. The force with which the water rushes up into the tender is simply enormous, as travellers have good reason to know if the scoop should be lifted from the trough a moment too late, and the upward rush of water should pour over the top of the tender and give the leading coaches of the train an unpleasant shower-bath—an experience which I have undergone on several occasions. Well-authenticated stories also occur to my mind of occasions when an inability on the driver's part to raise the scoop has resulted in nearly the whole of the coal being washed off the tender, leaving him at his wit's end to know how to find fuel in order to reach his destination.

The spray thrown up, as a result of the scoop cutting the water, is really not so serious as it appears in a photograph, but still the perpetual dampness of the permanent way surrounding water-troughs is such that specially efficient drainage has to be installed, and the line at these points requires to be ballasted with large hollow broken slag or stone, to enable the surface water to drain away as quickly as possible. This is the principal cause of the peculiar hollow roar with which we are so familiar when passing over water-troughs, and which is also partly due to the very damp condition of the track.

It is very evident that such a useful device as the track water-pick-up trough has now "come to stay," and even on the London & South-Western Railway "coming events" have "cast their shadows before" by the equipment of the tenders of the latest locomotives of this line with water-pick-up apparatus. The next thing we need to see is an adaptation of the principal in a miniature railway system.

**L.N.W.R. BIRMINGHAM EXPRESS SMASH.**

WE have to record an accident at Northampton station on Wednesday, 20th April, to a Birmingham-London express, which is due out of Northampton at 11-21 a.m. Our photographs, taken by Mr. Bassett-Lowke just before



the breakdown train arrived, show the extent of the damage. No one was seriously injured, the driver of the express loco "Collingwood" No. 1935 (one of the Webb four-cylinder compounds rebuilt as a simple) suffering the most.

## A MODEL "L.S.W." RAILWAY.

BY H. G. JOBSON.

FOR almost as long as he can remember the "manager" of this railway has been a model railwayac of one kind or another. As usual, the start was made with a No. 1 gauge German 0-4-0 clockwork loco. From this he has progressed by degrees *via* an electrically-worked No. 1 gauge line to the L. & S.W.  $\frac{3}{8}$ " scale model railway described below.

This has been laid out on the floor of a room 18'  $\times$  14', and is in the shape of an oval with sidings on the inner side for convenience of working.



NO. 1 GAUGE L.S.W.R. TRAIN IN "COOMBE" STATION.

As will be seen from the plan, the Coombe sidings are very extensive, as a large amount of rolling stock has to be shunted here. The electric works ("Coombe Electric Power Co., Ltd.") own a siding running alongside their building, where their wagons (one each City of Birmingham Coal and Coke Wagons) can unload. This power-house supplies light to both stations and engine house from a 4-volt. 60-amp. accumulator, lighting eight carbon filament lamps.

On the main lines the rails are "Lowko" track for curves and tin-plate for straights and points. Finely crushed stones are used as ballast, and serve this purpose very well, as they are only slightly disturbed by the vibration of passing trains. The signals are made up from standard small scale parts, and work excellently, even over a distance of 30' round several corners by means of the following small device, the illustration of which is self-explanatory (Fig. 2). This arrangement is not in the least obtrusive, and in practice never fails. The "wire" is ordinary whip-cord running through staples.

We will now take our readers a tour of the line. Starting north from Coombe Station, which consists of two platforms, one being an uncovered island and the other having the station buildings (B-L) in the middle, we

enter Coombe Tunnel (80' scale measurement). This runs under rising ground 50' high. Emerging from this, and passing Coombe level-crossing, we approach North Stoke Cutting. This is spanned by an iron footbridge, and has a platelayers' hut at the south end.

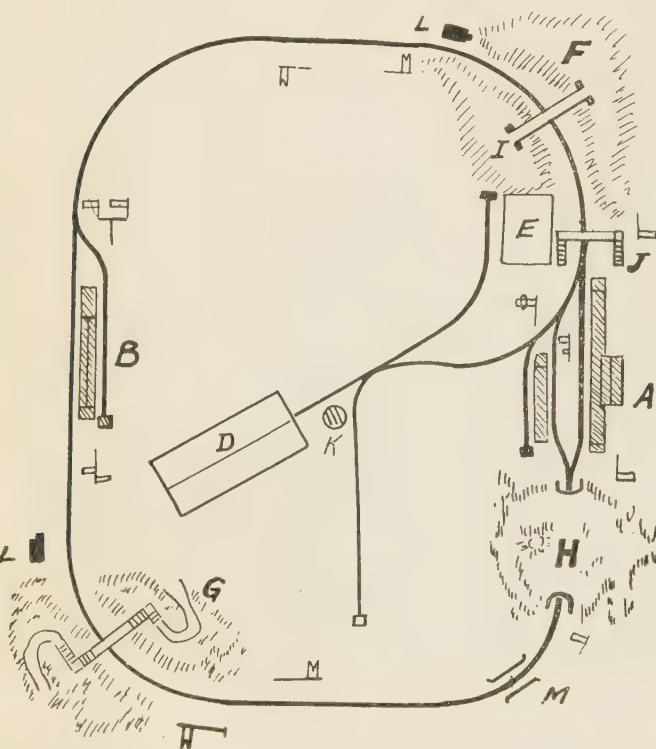


FIG. 1.—PLAN OF LINE.

KEY TO PLAN :

- |                     |                         |                   |
|---------------------|-------------------------|-------------------|
| A—"Coombe" Station. | F—South Coombe Cutting. | J—Footbridge.     |
| B—"Stoke" Station.  | G—North Stoke Cutting.  | K—Water-tank.     |
| D—Engine house.     | H—Coombe Tunnel.        | L—Huts.           |
| E—Power station.    | I—Girder bridge.        | M—Level crossing. |

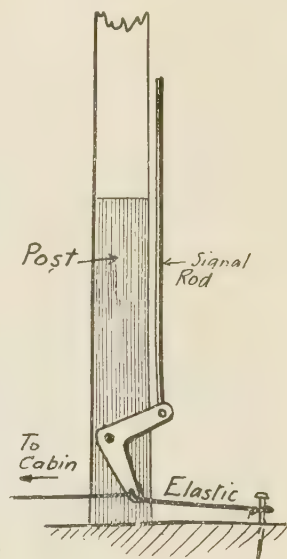
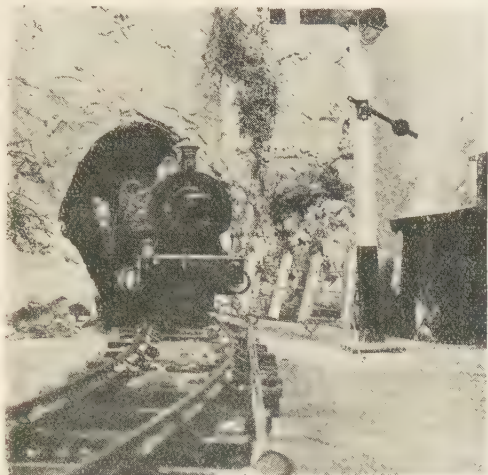


FIG. 2.—METHOD OF ASSISTING THE RETURN MOVEMENT OF THE SIGNALS.

The train now enters Stoke Station, a single covered platform on one side, and a wall covered with advertisements on the other. A siding is fitted here. There then follows a long run through uninteresting scenery till the train reaches South Coombe Cutting, very deep, and spanned by a 40' (scale measurement) girder bridge. Its dimensions are height 40', length 53 yards. Our circle is now nearly finished, and having passed South Coombe Junction box, we enter the station from which we started.

The cuttings and tunnel are home-made. For the sides of the cuttings wood or cardboard foundation is employed, on which is placed a large thick sheet of brown paper, covered with a mixture of one-half each Portland cement





MR. H. G. JOBSON'S MODEL  
RAILWAY.

ENTRANCE TO "COOMBE"  
TUNNEL, SHOWING "PECKETT"  
LOCOMOTIVE.

MR. H. G. JOBSON'S MODEL  
RAILWAY.

MODEL L.S.W.R. TRAIN  
PASSING UNDER GIRDER  
BRIDGE OVER SOUTH  
COOMBE CUTTING.



and sand. The construction of the cuttings will be better shown by a diagram (Fig. 3). The old cardboard and wooden boxes are used as a core, and round these are heaped small bundles of firewood until the right shape has been formed, when the whole is plastered over with cement and stones stuck in it where desired. The cement will be hard as a rock in twelve hours, but it is extremely important only to use *washed* sand.

The tunnel was constructed of a packing-case, over which cement was

roughly smeared, and while wet, stones and virgin cork were stuck in the surface, as already mentioned.

The rolling stock and locomotives at present consist of the following :—

No. 109, 0-4-4 L.S.W.R. Side Tank (for passenger work).

No. 101, 0-4-0 Peckett Saddle Tank (for goods work).

Two L.S.W.R. five-compartment passenger coaches.

One L.S.W.R. brake-van.

One horse box.

and the following goods vehicles :—

City of Birmingham coal wagon.

M.R. cattle truck.

coke wagon.

L.N.W.R. timber wagon.

G.W. 8-ton open wagon.

Anglo-American oil tank.

G.W. covered goods wagon.

M.R. brake-van.

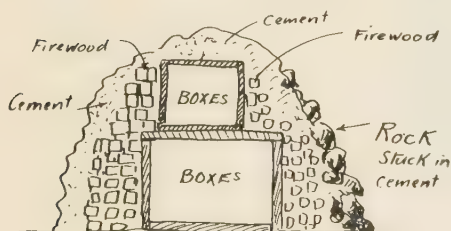


FIG. 3.—  
METHOD OF BUILDING UP  
CUTTINGS.

As will be seen from the accompanying photographs, Messrs. Hull's station staff are used, and look most effective.

Should any reader wish to know more regarding the construction of my railway, etc., I shall be very pleased to help him to the best of my ability, and shall be also glad to hear from any model railway enthusiast in this district (Sidmouth, Devon), and show him the model. In conclusion, I may add that everything except engine, rolling stock and permanent way is of home manufacture.

THE scheme for the construction of a diminutive underground electric railway for the transport of parcels and sacks of mails in Berlin, states the *Electrical Review*, has hitherto not been settled in so far as the proposed route is concerned, although it is assumed that the tunnel line will proceed from the post-office in the Spandauer Strasse to the future large office in the Franzosische Strasse, and thence to the busy post-office at the Potsdam Railway Station. In the meantime an experimental line in illustration of the projected system has been laid down at the Siemens-Schuckert works on the Nonnendamm. It has been inspected in operation by many engineers, including two officials of the English post-office, who were dispatched from London to Berlin for the purpose of examining the equipment. The railway, which is 1' 4½" in gauge, has a total length of 1,330'; the locomotive is 5' long and 1' 6" high, and is able to haul four loaded trucks at a speed of 25 miles an hour.



## THE BRUSSELS MINIATURE RAILWAY.

SINCE the publication, in our April issue, of the article describing this new venture of the Miniature Railway Co., we have been informed that some slight modifications and improvements have been put in hand and carried through for the greater attractiveness of the line and the greater delectation of the public.

The main item in this new programme is a tunnel, hewn and blasted, apparently, through a vast accumulation of rocks and moss-covered boulders [*Our readers may remember that our facetious correspondent was greatly struck with the variegated nature of the soil in the grounds, and no doubt this sudden granite excrescence tends to confirm his views.—ED.*] There are two separate tunnels proper, one for the up and one for the down line, so that the entrance at each end calls to mind a scale model of the Shakespeare's Cliff tunnel, near Dover, on the S.E. & C.R. main line, the mouths consisting, of rough-hewn granite blocks. The shape of the mouths naturally do not exactly correspond to the classic curves one is usually accustomed to, but this is owing to the difficulties anticipated by the Company in finding live, paying, scale model passengers.

Situated on the curve, the tunnel is 40 yards long, and will thus be able to impress passengers with that sense of damp, smoky gloominess, reminiscent of the old District or the Simplon subway. However, after the due shivering sensation has been experienced by the passengers, their sense of anguish soon comes to an end by the train emerging, figuratively, into another part of the world, that is, alongside another attraction. No doubt, that, with a few picturesque whistle-calls thrown in during the "underground" journey, and, maybe, the fire-door open and blower and cylinder drain-cocks in activity, the general effect will be cyclopean and Turneresque.

At the stations the lines have been laid somewhat differently to what had been previously planned, and this in view to saving "unprofitable mileage" during the shunting evolutions performed by the locomotives (*see figure*). When train is in station, the engine is detached and runs on to buffer-stops, then backs by points A to line 2, and by points B back to line 1; the train starting back on its journey, goes along line 1 till points C, which bring it to its proper line 2. Naturally, all points are automatic in their action.

Another improvement consists in the devising of an automatic signalling arrangement, to do away with the necessity of some person being specially detailed at each station for working the signals. The method of operation is the following:—All signals stand normally "on," that is "line closed"; when the two trains are due to start, one lever, at one of the stations, is worked, and pulls "off" both starters at the two stations; this operation is performed by the guard who happens to be at the proper station. The trains then start, either simultaneously or not, and when well clear of the station and points meet the automatic treadle arrangement which pulls "off" the home and distant signals protecting the station left by train, the train coming in the opposite direction being therefore duly advised if the station is clear or not. When the two both arrive at their respective termini, the guards manipulate special levers which throw back to danger homes and distants, thereby setting the treadles ready for a fresh train; the two starters are also put back to danger by the other lever alluded to above. The treadle is so constructed that when worked by the leading wheels of the engine or tender it falls into a "low" position out of the way of the rest of the passing wheels of the train.

We hope to give in a subsequent issue further details of this automatic treadle apparatus, which has been devised by Mr. L. Hervé, who is looking after the Miniature Co.'s interests at Brussels, as, possibly, it might supply the wants of some of our readers who run model lines, and occasionally meet with signal-working difficulties.

The Company have also arranged to dispense with the usual turnstile arrangements so characteristic of exhibitions, but will realistically work with

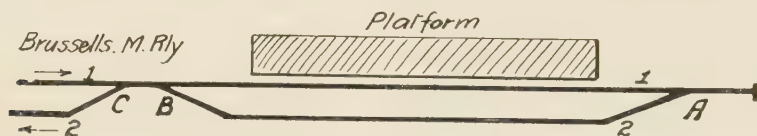
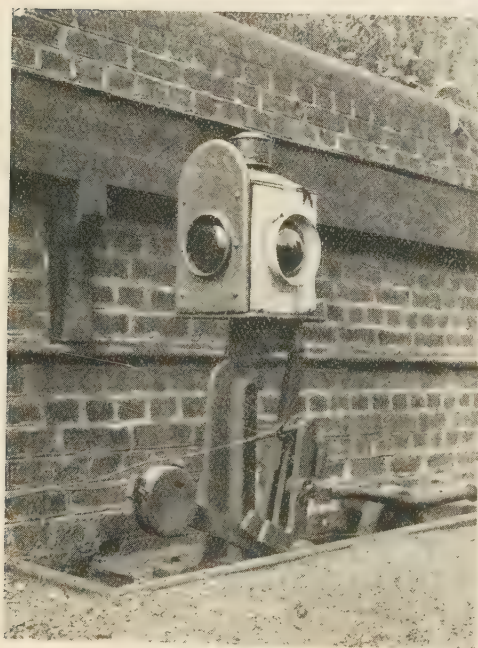


FIG. 1.—PLAN OF STATIONS.

proper tickets, which will remain the property of passengers as mementoes, purchased at the station booking-offices and nipped afterwards by a bell-punch apparatus carried by guards. Single and return tickets will be issued, and also, probably, series of prepaid tickets for *habitués*.

To-day, Jacks proudly float over the station buildings, all the woodwork of which is finished, and in a week's time they will be ready for work, while locos and carriage stock are due in Brussels in a few days in order to thoroughly "bed" down the road by the fatidical 23rd, now close upon us.



### L.N.W.R. GROUND SIGNALS.

WE illustrate herewith the standard L.N.W.R. disc signals, the new lighting arrangements of which we illustrated in our last issue. The lamp is square, and revolves in a bracket casting, the weighted lever being used to bring it back to "danger." The "danger" face, that on the left in the photo, is larger than the sides, and is painted a bright red.



# Carriages & Wagons



## BUILDING UP MODEL PASSENGER CARRIAGES.

[*Besides being of general interest, this article is intended to assist those readers who are building up the sets of parts which are now on the market.—EDITORS.*]

How many railway enthusiasts, after devoting hours of trouble and toil to the designing and building of a model railway, and becoming possessors of an engine and tender (or perhaps two or three), only then realise that although the building of the line is a most engrossing and instructive task, yet the real sustaining interest of a model railway lies, not in running an engine alone, but in manipulating whole trains, both passenger and goods.

Of late years the goods department of the model railway has been well catered for, not only as regards finished rolling stock, but also the sets of machined parts, which enable the veriest beginner to make up really first-class model goods stock of the latest type. The same facilities are now being provided for in the building of passenger rolling stock, and the following article is written in the hope that it may induce many, who have hitherto considered that the building of passenger rolling stock was a very complex and difficult job for the amateur to tackle, to seriously turn their attention to this most entertaining section of model railway work.

Without passenger stock, a model railway cannot be seriously considered at all complete and the full enjoyment cannot be obtained from the hobby. With the assistance of these sets of parts it will be found that after all the coach-building is not actually a very difficult affair, and those readers who have already assembled some of the sets of parts of goods stock will find no difficulty at all in it. Indeed, to build an ordinary passenger coach, say an L. & N.W. or a G.N., will not be found much more difficult than the building of, say, a guards van or a cattle wagon, and with the new sets of parts an amateur who is not a skilled wood-worker, may turn out a coach of which he may well be proud, and from which he may obtain many hours of pleasurable enjoyment, of which the building is not the least. In these parts the "donkey work" is done, the hard sawing, the knotty points (no pun), such as the selection of the most suitable wood, the scheming necessary to enable the design to be adhered to externally, and at the same time to eliminate the finicking and troublesome details, which are not at all necessary to obtain the true effect in the finished coach, but at the same time require a great deal of skill and consideration in leaving out, as many of them at first sight seem essential, is all done. No attempt should be made to introduce inside fittings into any coach of, say, 2" or 2½" gauge, or indeed in even the larger sizes until about 1½" scale is reached, as no satisfaction is to be obtained with inside fittings under this scale. If this detail is attempted and completed, it will be so small that it will not show to anything like advantage behind the glass, and it will certainly be found much better to leave it all out as advised, and put all the pains and fine work on the outside, where the result

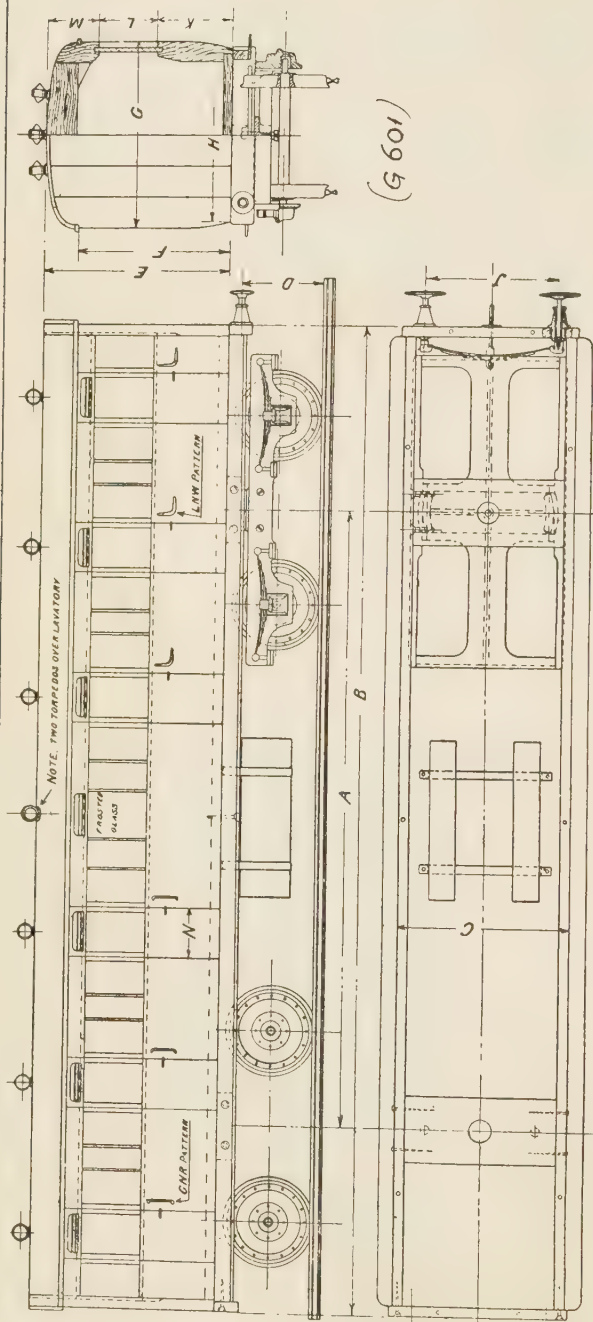


FIG. 3.—MODEL PASSENGER CARRIAGE.  
(Built from standard parts No. G 601 C and G 601 B.)

DIMENSIONS.

| GAUGE.       | A        | B       | C       | D        | E      | F      | G      | H       | I        | J        | K      | L      | M      | N       |
|--------------|----------|---------|---------|----------|--------|--------|--------|---------|----------|----------|--------|--------|--------|---------|
| 2 1/2 inches | 13 5/32" | 21 1/8" | 3 5/8"  | 1 3/4"   | 4"     | 3 1/4" | 4"     | 3 1/16" | 2 13/16" | 1 5/8"   | 1 5/8" | 1 1/4" | 1 1/8" | 1 3/32" |
| 2 inches     | 11 9/16" | 18 1/2" | 3 3/16" | 1 17/32" | 3 1/2" | 2 5/8" | 3 1/2" | 3 1/4"  | 2 1/2"   | 1 13/32" | 1 1/8" | 3 1/2" | 3 1/2" | 1 1/8"  |

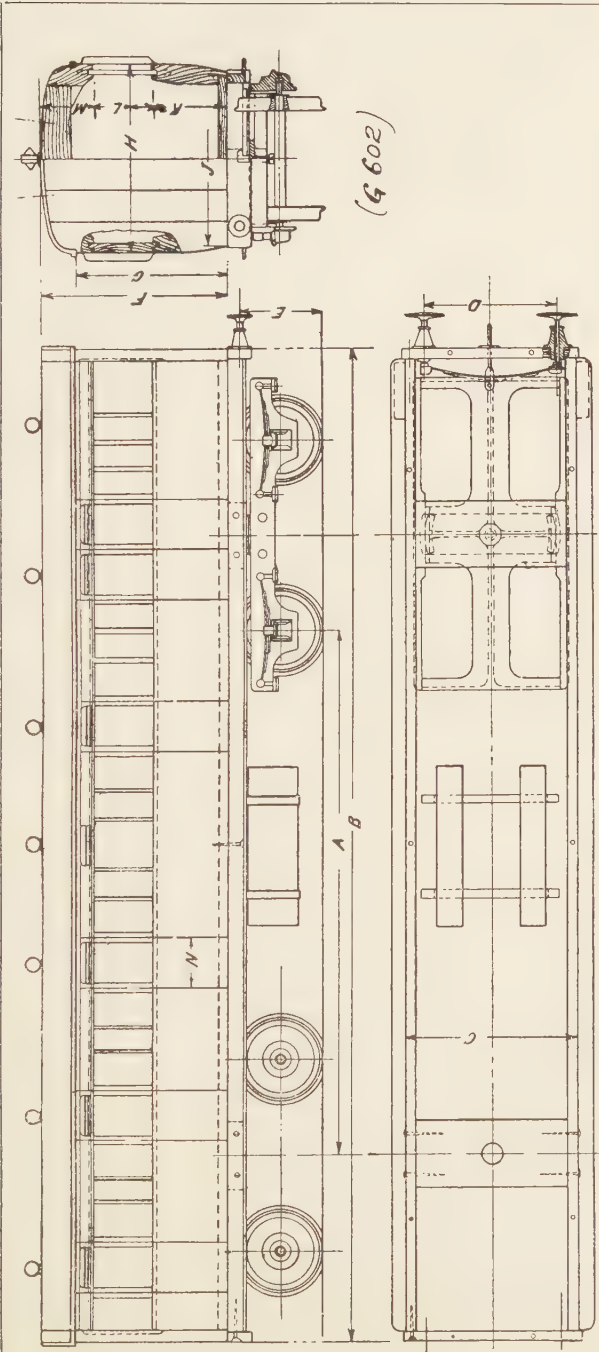


FIG. 4.—MODEL "BRAKE THIRD" (COMPOSITE THIRD-CLASS PASSENGER AND GUARD'S COMPARTMENT VEHICLE).

(Built in wood from standard parts No. G 602 C and B.)

| DIMENSIONS. |         |        |        |         |         |       |       |       |        |        |       |       |        |
|-------------|---------|--------|--------|---------|---------|-------|-------|-------|--------|--------|-------|-------|--------|
| GAUGE       | A       | B      | C      | D       | E       | F     | G     | H     | J      | K      | L     | M     | N      |
| 2½ inches   | 13 5⁄32 | 21 1⁄8 | 3 5⁄8  | 2 13⁄16 | 1 3⁄4   | 4"    | 3 1⁄4 | 4"    | 3 1⁄16 | 1 5⁄8  | 1 1⁄4 | 1 1⁄8 | 1 3⁄32 |
| 2 inches    | 11 9⁄16 | 18 1⁄2 | 3 3⁄16 | 2 1⁄2   | 1 13⁄16 | 3 1⁄2 | 2 7⁄8 | 3 1⁄2 | 3 1⁄4  | 1 3⁄32 | 1 1⁄8 | 3 1⁄2 | 1 5⁄16 |

will be seen, and certainly more appreciated. If the glass is properly fitted, and the inside of the coach painted with a black paint drying with a flat surface, the absence of inside fittings will not be seen. The lighting of the interior with electric lights may be done, but nothing more should be attempted; this should be the sole exception to the above rule. This lighting produces a very pretty effect, especially at night, and is well worth the trouble when the coach is not smaller than 2" gauge, but under this size there is not much room for accumulators; they *can* be fitted, but it is difficult to keep them out of sight. Never begin your coach-building by starting the underframes first; build the body complete, and when it is finished, build the underframe quite separately, fit it to the coach, and screw to the body with screws; now remove the body from the frame and fit the bogies, buffers, accumulator boxes, draw-hook and all the fittings which it is intended to fit; when these are all on, screw the body on to the underframe for good. This is much the best and simplest way to get the fittings on, and avoids the necessity of turning the coach bottom upwards in order to fix the fittings, which certainly does the finished surfaces of the coach no good.

Perhaps it would be as well to consider first the tools necessary for the work before we begin in earnest. A very small stock of tools indeed will suffice:—A small metal plane of the "Stanley" type, one or two chisels, a small cross-paned hammer weighing about 4-ozs. (by a cross-paned hammer is meant one with upper end flat and at right-angles to the shaft, similar to that used for track laying), a small glue-pot, an Archimedian brace and about six small drills of various sizes from about  $\frac{1}{32}$ " to  $\frac{1}{8}$ ", a fine toothed saw, scribe, and two or three cramps as used for fretwork, capable of taking in about 5", will complete the outfit. The plane, chisels and saw must be very sharp, otherwise good work will be impossible. We are now ready to begin in earnest.

The first thing the builder should do is to look over the material, and lay the parts out according to the drawing, so that he may know all the parts and be able to pick them out when assembling without trouble. There should be two pieces for the lower sides as at A (Fig. 1) machined up and slotted for the glass, two pieces for the top sides B similarly machined, and in addition having a channel cut from end to end for the water shed as at E. A piece of soft pine for the top, four pieces for the underframes, one piece for the floor, a large number of small pieces to go to form the uprights between the windows, glass for the windows, an assortment of screws and pins, door handles, commode handles, accumulator boxes and hangers, bogie castings, bogie wheels and materials for axles, buffers, buffer guides, springs, drawhooks and drawplates, torpedo ventilators, etc., and also two drawings, one shewing the construction and one to shew the painting, lining and lettering. This second drawing does not concern us at all in the meantime. It will be noticed that the pieces for the top B are not rounded on the corner as at E, and the reason will be seen later. The amateur will no doubt feel strongly inclined to begin by planing these parts off first, but this must on no account be done until the whole coach is assembled and glued up.

The proper way to begin with is to take the part C (Fig. 1) and the two parts B, and carefully plane up the faces of the joint at H; these two joints must be planed up quite straight and must make a perfectly close joint all the way along, mark the faces which come next each other so that there will be no difficulty in jointing the right edges when the glue is applied. Have both joints quite perfect and lay aside. Matters should have been so arranged that the glue is now quite ready to use. Only the very best quality should



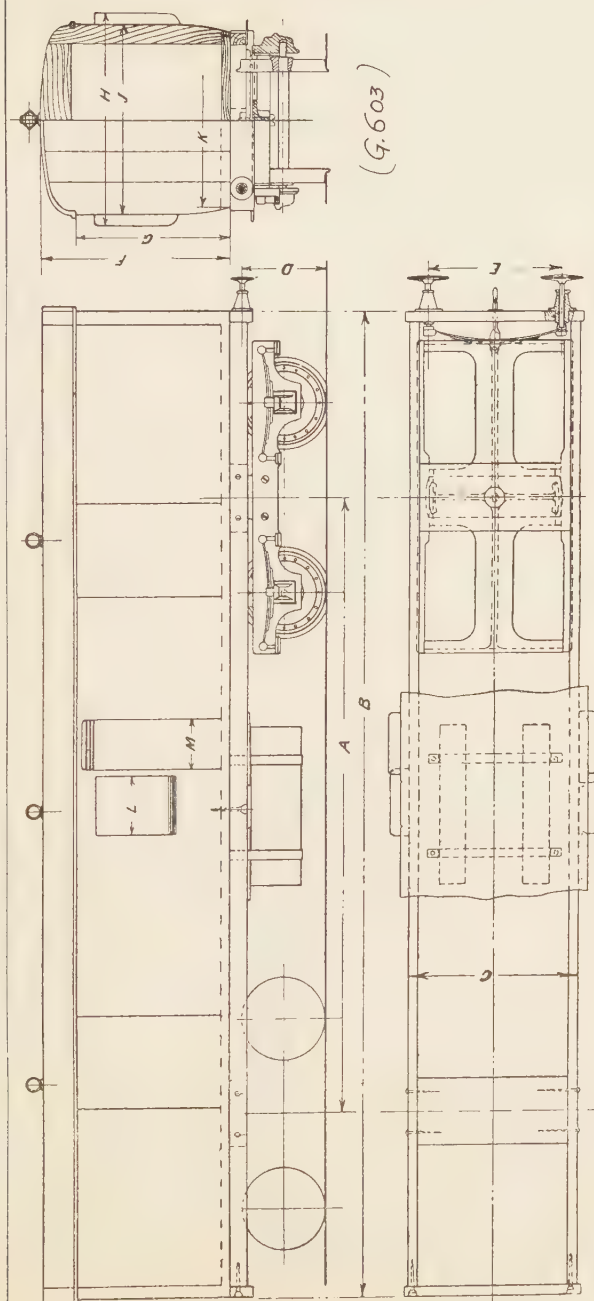
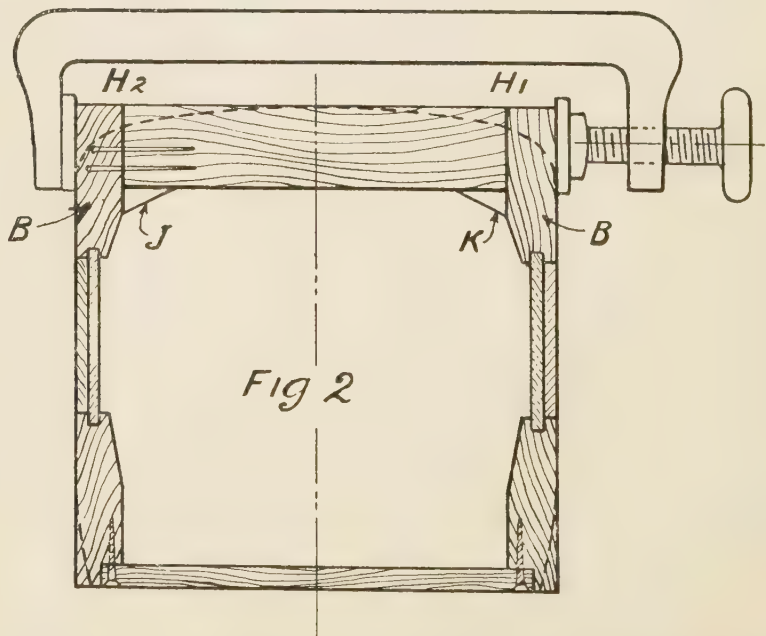
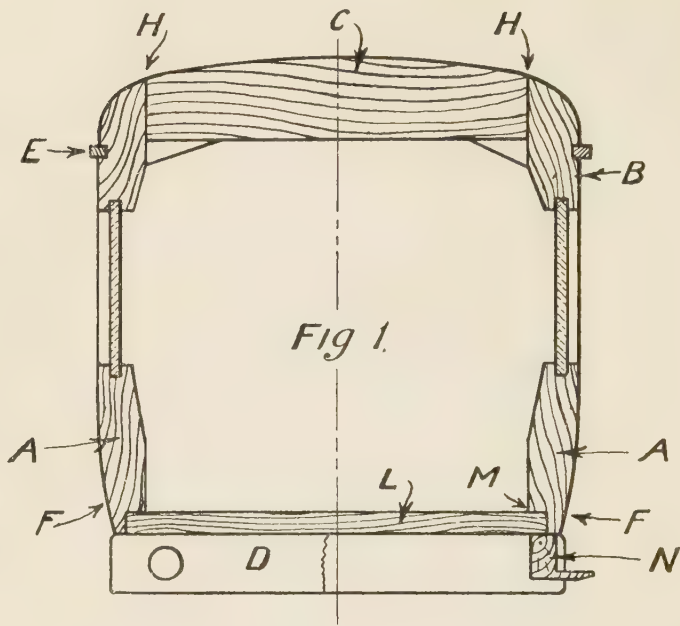


FIG. 5.—SCALE MODEL LUGGAGE BRAKE-VAN.  
(Built from wood parts Nos. G 603 B and G 603 C.)

| DIMENSIONS. |          |         |         |          |          |        |        |        |        |         |         |         |
|-------------|----------|---------|---------|----------|----------|--------|--------|--------|--------|---------|---------|---------|
| Gauge       | A        | B       | C       | D        | E        | F      | G      | H      | J      | K       | L       | M       |
| 2½ inches   | 13 5⁄16" | 21 1⁄8" | 3 5⁄8"  | 1 3⁄4"   | 2 13⁄16" | 4"     | 3 1⁄4" | 4 1⁄2" | 4"     | 3 1⁄16" | 1 5⁄16" | 1 3⁄32" |
| 2 inches    | 11 9⁄16" | 18 1⁄2" | 3 3⁄16" | 1 17⁄32" | 2 1⁄8"   | 3 1⁄2" | 2 3⁄2" | 3 1⁄8" | 3 3⁄8" | 3 1⁄4"  | 1 1⁄8"  | 1 5⁄16" |



CONSTRUCTIONAL DETAILS OF SCALE MODEL COACHES

be used for this class of work, a medium quality or "a good" quality should be refused when offered—the best is hardly good enough. We will now glue up the two joints which we have just prepared, H (Fig. 2), slightly warm the four surfaces and cover lightly and quickly with the glue the two H1; now lay B on the bench with the inside uppermost, and lay C on it, keeping

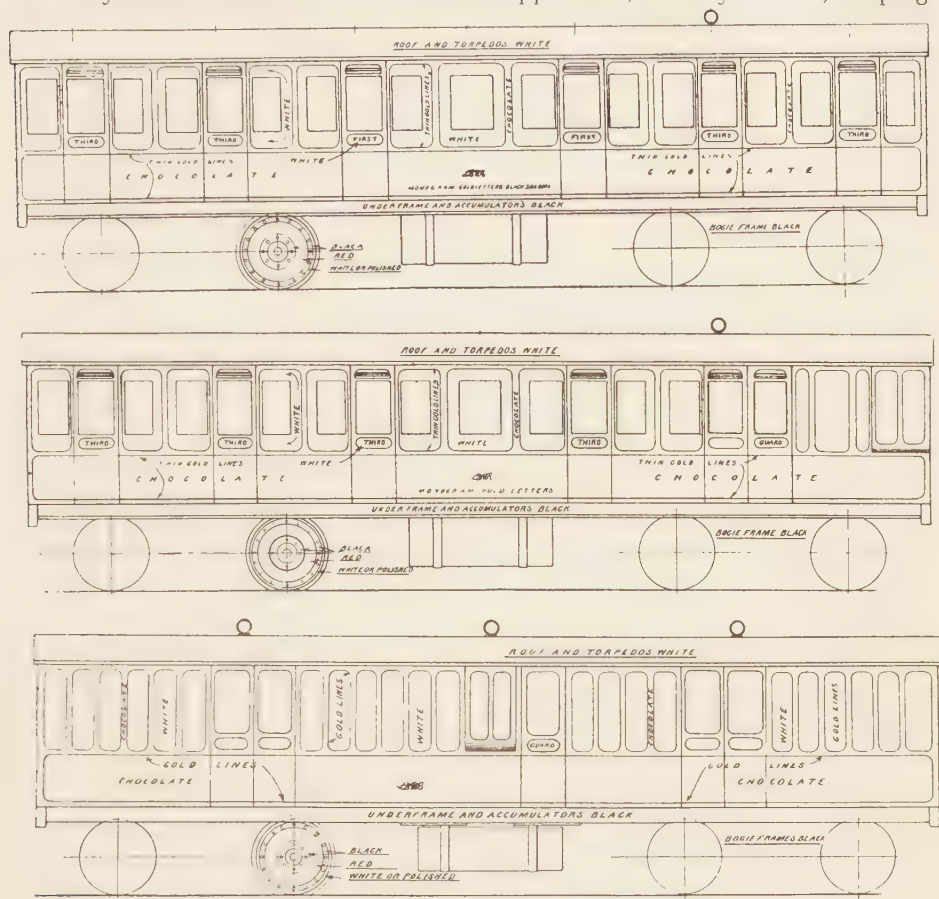


FIG. 6.—PAINTING AND LINING DIAGRAM FOR FINISHING MODEL PASSENGER CARRIAGE, BRAKE THIRD, AND GUARD'S VAN, IN L.N.W.R. COLOURS.

the outside edges flush, press well down, and at the same time rub C back and forth endwise on B1, so as to squeeze out as much glue as possible. This is a most important thing and ensures the utmost strength in the joint. Now glue up the two surfaces H2 (Fig. 2) and lay B2 on C and rub endwise as before. Drive a few long panel pins in each side, and cramp up as shewn in Fig. 2, using three cramps, one about 2" from each end and one in the middle. Now lay aside to dry for at least twelve hours, or longer. The two shaded pieces shewn between the cramp and the coach are only thin pieces of wood to prevent the cramp damaging the coach. Now will be seen the reason for leaving the top sides of the piece B square; if they had been rounded off it would be almost impossible to cramp them without a specially shaped cramp.

### CATCHING A TRAIN.

WE got to Waterloo at eleven, and asked where the eleven-five started from. Of course nobody knew; nobody at Waterloo ever does know where a train is going to start from, or where train when it does start is going to, or anything about it. The porter who took our things thought it would go from number two platform, while another porter, with whom he discussed the question, had heard a rumour that it would go from number one. The station-master, on the other hand, was convinced it would start from the local.

To put an end to the matter, we went upstairs and asked the traffic superintendent, and he told us that he had just met a man who said he had seen it at number three platform. We went to number three platform, but the authorities there said they rather thought that train was the Southampton express, or else the Windsor loop. But they were sure it wasn't the Kingston train, though why they were sure it wasn't they couldn't say.

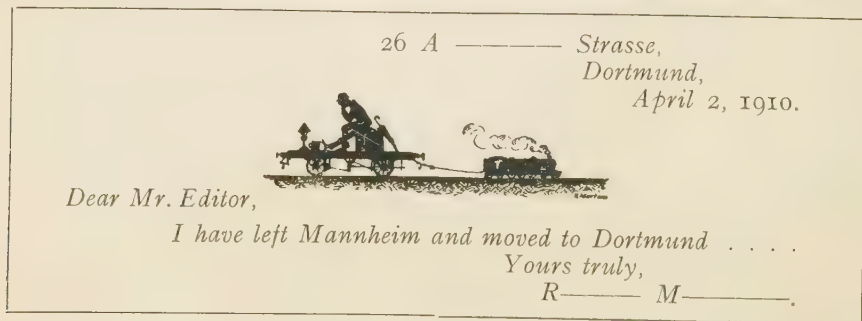
Then our porter said he thought that must be it on the high-level platform; said he thought he knew the train. So we went to the high-level platform, and saw the engine-driver, and asked him if he was going to Kingston. He said he couldn't say for certain, of course, but that he rather thought he was. Anyhow, if he wasn't the 11.5 for Kingston, he said he was pretty confident he was the 9.32 for Virginia Water, or the 10 a.m. express for the Isle of Wight, or somewhere in that direction, and we should all know when we got there. We slipped half-a-crown into his hand and begged him to be the 11.5 for Kingston.

"Nobody will ever know on this line," we said, "what you are, or where you're going. You know the way, you slip off quietly and go to Kingston."

"Well, I don't know, gents," replied the noble fellow, "but I suppose some train's got to go to Kingston; and I'll do it. Gimme the half-crown."

Thus we got to Kingston by the London and South-Western Railway. We learnt afterwards, that the train we had come by was really the Exeter mail, and that they had spent hours at Waterloo looking for it, and nobody knew what become of it.—From *Three Men in a Boat*, by Jerome K. Jerome.

ILLUSTRATING correspondence and other records of everyday events by means of railway pictures is becoming almost an epidemic. We recently received the following postcard from one of our German subscribers notifying his change of address. Perhaps he has not calculated how long it would take him to move his belongings if his model had to pull all of them to Dortmund.

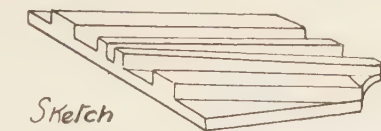




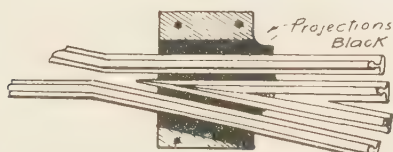
## MAKING POINTS WITH "LOWKO" TRACK MATERIAL.

READERS who are using the small size "Lowko" rail, either brass or tin-plate variety, for making up points and crossings, will be interested to note that until such time as the proper sheet metal stampings are ready, brass castings, as the accompanying sketches, are available for the check rails and frogs.

The frog castings are plates of metal with projecting ribs on the upper surfaces, these ribs being set at the correct angle and spaced at the proper



*Sketch  
of Frog plate*



*Plan of Complete Frog*

distance apart to ensure the frogs making up to the standard dimensions published in our 6d. handbook. The angle of the frogs is 1 in 4. The frogs are screwed to the wooden sleepers in the usual manner, and to the amateur worker are a great improvement over the plain plates or strips of metal usually employed in laying out small scale frogged points.



*Section  
(finished)*



*Rough Casting*

The check-rail chairs have two slots cast in them, which should be filed out to fit the bottom of the rails, care being taken to finish the spaces in accordance with the standard dimensions above referred to. These castings can also be employed for scale model permanent way. The strips of metal up to the present time employed, to which the rails are only soldered, provide very little lateral strength and have called for this or a similar improvement. The cost of the castings are respectively 6d. and 2d. each.



As noted in our last issue, Messrs. W. J. Bassett-Lowke & Co. are now trading under the name of "Bassett-Lowke, Ltd." The registered office is Kingswell Street, Northampton.



MR. H. THOMPSON, Holly Lane, Erdington, Birmingham, would be pleased to meet any reader not over 18 who would be prepared to go shares in the collection of a No. 0 gauge model railway (to scale preferred). He at present possesses several models, which he would be pleased to put towards the railway. He would like also to form some sort of model railway club in the district.

## CAPTAIN COLSTON'S No. 0. GAUGE MODEL "Q.P. RAILWAY."

BY THE EDITORS.

AT Captain Colston's kind invitation, the Editors visited his house to inspect the lay-out and working of the excellent model railway he has for the past year or so been perfecting. Unlike most model railways of interest, the system is entirely portable, and is limited to tin-plate rails and rolling stock and to engines of the clockwork variety. In spite of this, which may to some appear a drawback, we did not anticipate the excellence of the whole scheme, and can assure the sceptical that there is still much to be said for the "tin-plate" portable railway.

The general plan of the railway when laid out is shown in our sketch Fig. 1 herewith, and, as will be seen, in the sequence of stations it represents the old main line section of the Great Western Railway as far as Bristol, with a branch to Weymouth and the new competing line to the Capital of the Midlands.

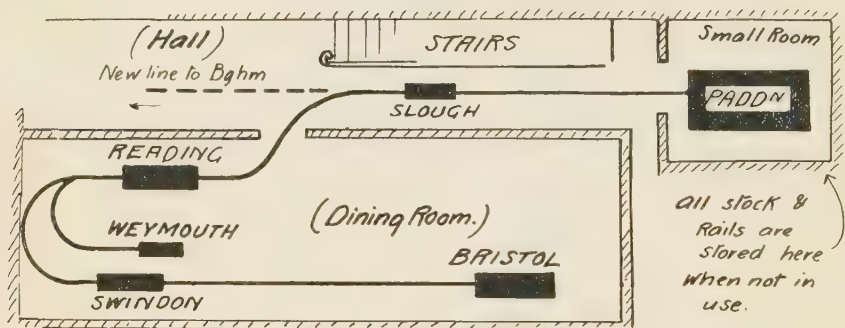


FIG. 1.—GENERAL PLAN OF THE LINE WHEN LAID DOWN.

The whole of the outfit, which is extensive, when not in use, is stored in one room—the site of the "Paddington" Station, the latter, however, not being disturbed.

The gauge of the railway is the smallest available, and twenty-one engines are in use. The carriage and wagon stock we could not very well count, but it must comprise over a hundred vehicles.

When laid out, trains are run according to a time-table, a copy of which Captain Colston kindly allowed us to purloin for reproduction herewith, together with details of the running and disposition of the stock at the commencement. It takes three persons to run the prescribed trains, and the complete cycle of operations occupies no less than one hour twenty-five minutes. The times are actual—starting from the level hour (nine o'clock in the time-table)—and it takes a considerable amount of practice to keep the trains to time. Mr. Hamilton, one of the "manager's" colleagues, says that they recently worked the time-table throughout without a hitch, losing time near the middle, but regaining it towards the finish.

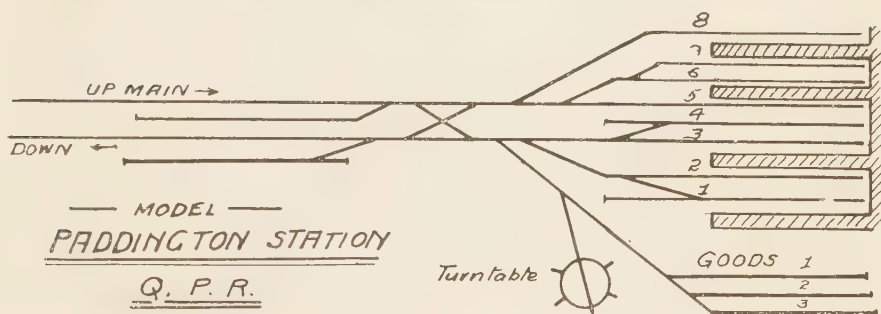
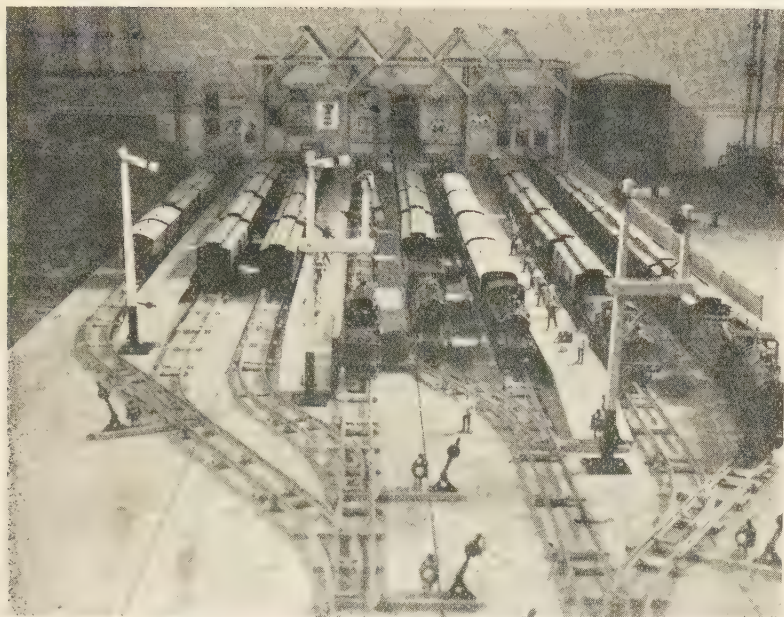


FIG. 2.—PHOTOGRAPH AND DIAGRAM OF MODEL PADDINGTON STATION.

One point worthy of our readers' attention is the care with which the rails are laid down and the way the engines and coaches are "tuned up" to get the most out of them. It surprised us to find that Captain Colston gets his clockwork engines to pull an average load of six or seven bogie passenger coaches, and we were able to see the "compound" loco, as it is called, pull a train of thirteen bogie carriages from "London" to "Bristol," a distance of ninety feet, without a sign of reluctance. This engine, like all Captain Colston's locos, is fitted with rubber bands to the driving wheels. It has, however, an additional feature of a unique character, viz., a clockwork driven tender, from whence it earns its name of the "compound." The locomotive is a standard G.N.R. "Atlantic" clockwork engine purchased from Messrs. Bassett-Lowke, Ltd., into which a standard clockwork movement

|            | TIME TABLE. |      |     | MODEL Q. P. RAILWAY |      |      |              |      |             |      |                   | DOWN.       |       |       |
|------------|-------------|------|-----|---------------------|------|------|--------------|------|-------------|------|-------------------|-------------|-------|-------|
|            | TRAIN No.   | 1    | 3   | 5                   | 8    | 10   | 12           | 13   | 14<br>Go'ds | 17   | 19                | 22<br>Go'ds | 24    | 26    |
| PADDINGTON | ..... Dep.  | 9.0  | 9.5 | 9.10                | 9.20 | 9.26 | 9.28         | ..   | 9.40        | 9.55 | 10.6              | 10.13       | 10.21 | 10.23 |
| SLOUGH     | .....       | 9.1  |     |                     | 9.27 | 9.27 | RIVIERA      | ..   | 9.41        |      | WEYMOUTH EXPRESS. | FAST        | 10.22 |       |
| READING    | ..... Arr.  | 9.2  |     |                     | 9.28 | 9.28 | 9.29         | ..   | 9.42        |      |                   | 10.14       | 10.23 |       |
| WEYMOUTH   | ..... Dep.  | 9.6  |     |                     | 9.22 | 9.32 | Slip         | 9.36 | 9.52        |      |                   | 10.15       | 10.24 |       |
|            | ..... Arr.  | 9.10 |     | 9.12                | ..   | 9.36 | 9.36<br>via. | ..   | ..          |      | 10.7              |             | ..    |       |
|            | Dep.        | 9.0  |     | Stop                |      | 9.25 | slip         | ..   | ..          |      | Stop              | GOODS.      | ..    |       |
| SWINDON    | .....       | 9.7  |     | ..                  |      | 9.33 | LIMITED.     | 9.37 | 9.53        |      | ..                |             | 10.25 |       |
| BRISTOL    | ..... Arr.  | 9.8  | 9.7 | ..                  | 9.23 | 9.34 | 9.30         | 9.38 | 9.54        | 9.57 | ..                | 10.16       | 10.26 | 10.25 |



| MODEL Q.P. RAILWAY.               |           |     |      |      |      |      |             |      |      |       |       |       |       | UP. |
|-----------------------------------|-----------|-----|------|------|------|------|-------------|------|------|-------|-------|-------|-------|-----|
| TIME TABLE.                       |           |     |      |      |      |      |             |      |      |       |       |       |       |     |
| TRAIN No.                         | 2         | 4   | 6    | 7    | 9    | 11   | 15<br>Go'ds | 16   | 18   | 20    | 21    | 23    | 25    |     |
| BRISTOL .....                     | Dep. 9.2  | 9.5 | 9.11 | ..   | 9.26 | 9.28 | 9.40        | 9.46 | 9.59 | ..    | 10.12 | 10.14 | 10.20 |     |
| SWINDON .....                     | 9.3       |     | ..   | ..   | 9.27 |      | 9.41        | ..   |      | ..    | 10.13 |       |       |     |
| WEYMOUTH .....                    | Arr. 9.10 |     | ..   | ..   | 9.36 |      | ..          | ..   |      | ..    | 10.18 |       |       |     |
| READING .....                     | Dep. 9.0  |     | ..   | 9.14 | 9.26 |      | ..          | ..   |      | 10.9  | 10.11 |       |       |     |
|                                   | Arr. 9.4  |     | 9.13 | 9.15 | 9.28 |      | 9.42        | 9.47 |      |       | 10.14 |       |       |     |
|                                   | Dep. 9.8  |     | Stop | 9.16 | 9.32 |      | 9.52        | 9.48 |      |       | 10.18 |       |       |     |
| SLOUGH .....                      | 9.9       |     | ..   | ..   | 9.33 |      | 9.55        | ..   |      |       | 10.19 |       |       |     |
| PADDINGTON .....                  | Arr. 9.10 | 9.7 | ..   | 9.17 | 9.34 | 9.30 | 9.54        | 9.49 | 10.1 | 10.10 | 10.20 | 10.16 | 10.22 |     |
| OCEAN MAIL SPECIAL. Mondays only. |           |     |      |      |      |      |             |      |      |       |       |       |       |     |
| SOUTH WALES EXPRESS.              |           |     |      |      |      |      |             |      |      |       |       |       |       |     |
| RIVIERA LIMITED.                  |           |     |      |      |      |      |             |      |      |       |       |       |       |     |
| CUNARD BOAT EXPRESS.              |           |     |      |      |      |      |             |      |      |       |       |       |       |     |
| BOAT TRAIN—<br>CHANNEL ISLANDS.   |           |     |      |      |      |      |             |      |      |       |       |       |       |     |

taken from an old loco is fitted, this driving the rear pair of wheels of the tender. The centre wheels are removed for the purpose of accommodating the mechanism.

To supplement the task of hauling the heavier trains on the "Q.P.R." Captain Colston is making a six-coupled express locomotive of the Caledonian "Cardean" type, a photograph of which in its present incompleted state we reproduce herewith. The locomotive will be among the few six-coupled clockwork models we have seen, and judging by results obtained by other

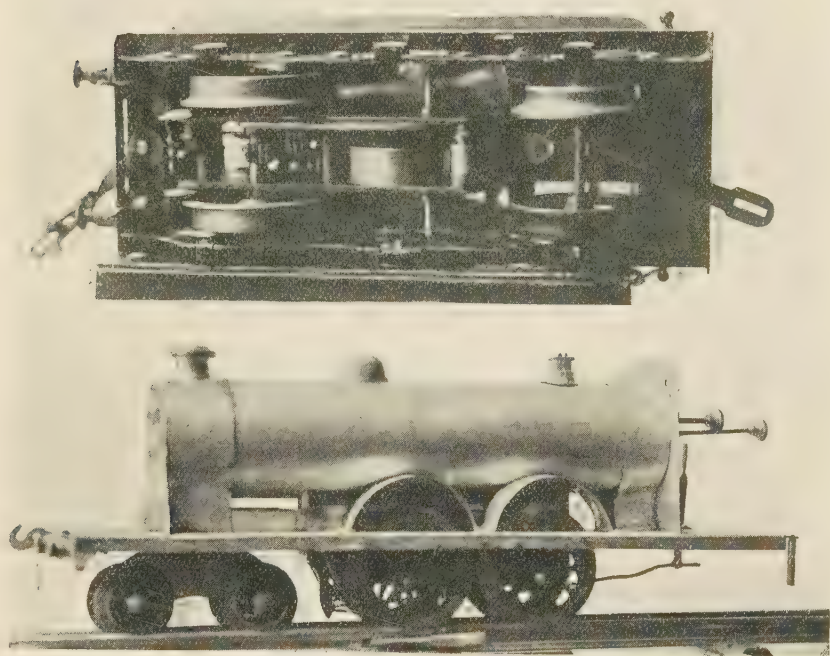


FIG. 3.—PHOTOGRAPH OF UNDERSIDE OF THE MOTOR TENDER OF THE G.N.R. "COMPOUND" CLOCKWORK MODEL "ATLANTIC" LOCOMOTIVE.

FIG. 4.—PHOTOGRAPH OF UNFINISHED NO. 0 GAUGE MODEL C.R. "CARDEAN" LOCOMOTIVE.

Q.P.R. locos, should prove an entire success. The destination boards on the coaches are made of the metal punched strips, which may be lettered to suit, supplied by automatic machines. They are painted as desired, and the paint rubbed off the raised letters.

At the double line junction of the new line for Birmingham, a special acute angle crossing has been made by Captain Colston. He says that it required a good deal of time and patience to make this, but it serves its purpose admirably. This fitment is however to become a standard, and before next season complete double junctions in all gauges will be obtainable, as announced in the *Model Railways Handbook*.

## Q. P. R.

## PADDINGTON STATION ORDERS.

| <i>Time.</i> | <i>Train.</i> |                                                                    |
|--------------|---------------|--------------------------------------------------------------------|
| 9-0          | 1             | <i>Ex. No. 4.</i>                                                  |
| 9-5          | 3             | <i>Ex No. 2 (5 coaches and Atlantic).</i>                          |
| 9-7          | 4             | <i>Arr. No. 7. Shunts out 9-21.</i>                                |
| 9-10         | 5             | <i>Ex No. 3.</i>                                                   |
| „            | 2             | <i>Arr. No. 4. Engine backs on from No. 5, and leaves at 9-26.</i> |
| 9-17         | 7             | <i>Arr. No. 3. Engine backs on.</i>                                |
| 9-20         | 8             | <i>Ex No. 2 (2 Vans and C.R. 4-6-0 Engine).</i>                    |
| (9-21)       |               | <i>Shunt No. 4 on to No. 2 new M.R. Engine standing on No. 5.</i>  |
| (9-23)       |               | <i>Shunt Compo. Atlantic from Shed on to Riviera Express.</i>      |
| 9-26         | 10            | <i>Ex No. 4.</i>                                                   |
| 9-28         | 12            | <i>Ex No. 1 Riviera.</i>                                           |
| 9-29         | 12a           | <i>Ex No. 2 2nd part Riviera.</i>                                  |
| 9-30         | 11            | <i>Arr No. 6. Shunts to No. 1 Siding.</i>                          |
| 9-34         | 9             | <i>Arr. No. 4.</i>                                                 |
| 9-40         | G 14          | <i>Ex Goods Yard.</i>                                              |
| (9-41)       |               | <i>No. 17 shunts on to No. 1 from No. 2 Siding.</i>                |
| 9-49         | 16            | <i>Arr. at No. 6. Shunts on to No. 2 Siding.</i>                   |
| 9-54         | G 15          | <i>Arr. at Goods Yard; may have to wait outside for No. 17.</i>    |
| 9-55         | 17            | <i>Ex No. 2.</i>                                                   |
| 10-1         | 18            | <i>Arr No. 7. Shunts on to No. 1.</i>                              |
| 10-6         | 19            | <i>Ex No. 3.</i>                                                   |
| 10-10        | 20            | <i>Arr. No. 3.</i>                                                 |
| 10-13        | G 22          | <i>Ex Fast Goods from Goods Yard,</i>                              |
| 10-16        | 23            | <i>Arr. No. 6. Shunts to No. 2.</i>                                |
| 10-20        | 21            | <i>Arr. No. 5.</i>                                                 |
| 10-21        | 24            | <i>Ex No. 4.</i>                                                   |
| 10-22        | 25            | <i>An American Mail Special (Mondays only) arrives No. 7.</i>      |
| 10-23        | 26            | <i>Ex No. 1.</i>                                                   |

The writers have to thank Captain Colston for a pleasant afternoon and for the still more agreeable demonstration of what can be done with a well-kept model clockwork locomotive.

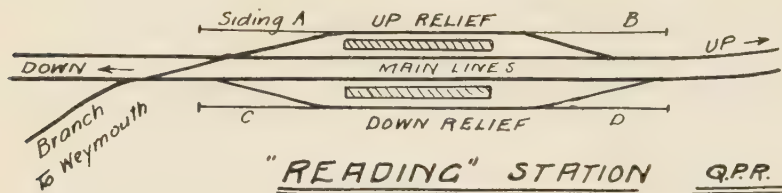


FIG. 5.

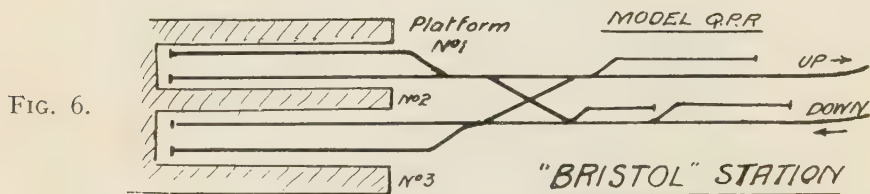


FIG. 6.

### LOCO. COACHING ARRANGEMENTS BEFORE STARTING RUNNING.

| ENGINES.              | COACHES.                       | GOODS.              | REMARKS. |
|-----------------------|--------------------------------|---------------------|----------|
| AT BRISTOL.           |                                |                     |          |
| Atlantic No. 3        | 5-coach G.N.R.                 |                     |          |
| Sydney No. 1          | 3-coach G.N.R.                 |                     |          |
| G.N.R. Bogie          | 4-coach G.W.R. Local           |                     |          |
| G.N.R. Bogie          | 1-coach G.W.R.                 |                     |          |
| L.S.W.R. Bogie        |                                | 10 trucks, 1 B-Van. |          |
| AT WEYMOUTH.          |                                |                     |          |
| L.N.W.R. No. 1        | 4-coach L.N.W.R.               | 5 Goods, 1 B-Van.   |          |
| L.S.W.R. Tank Peckett | 3-coach L.S.W.R.               |                     |          |
| AT READING.           |                                |                     |          |
| L.S.W.R. Bogie        | 1-coach                        | 8 Goods, 1 B-Van.   |          |
| AT PADDINGTON.        |                                |                     |          |
| Atlantic No. 1        | 8-coach G.W.R. Riviera         |                     |          |
| Atlantic No. 2        | 5-coach G.W.R. Cunard          |                     |          |
| Sydney No. 2          | 5-coach G.W.R. Birmingham      |                     |          |
| Sydney No. 3          | 4-coach G.W.R. + 1 Local       |                     |          |
| L.N.W.R. Tank         | 3-coach L.N.W.R.               |                     |          |
| L.N.W.R. Tank         | 2-coach G.W.R.                 |                     |          |
| L.N.W.R. Bogie        | 5-coach G.W.R. Channel Islands |                     |          |
| M.R. Bogie            | 2-coach spare                  |                     |          |
| M.R. Bogie            |                                |                     |          |
| M.R. Bogie            |                                |                     |          |
| M.R. Bogie            |                                |                     |          |
| Caledonian R.         |                                | 25 Goods, 4 B-Van.  |          |



# Letters to The Editors



TO THE EDITORS *Model Railways and Locomotives*,  
REDHILL TUNNEL, MIDLAND RAILWAY.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

In reply to Mr. Skelton's enquiry for a photo of Redhill Tunnel, I enclose a photo of same. The left-hand mouth of the tunnel is used for goods traffic and the right-hand for passenger. Directly to the north of the tunnel there is a large bridge across the Trent.—Yours truly,  
KEGWORTH, NEAR DERBY.

J. H. CORAH.



## CAPTAIN MOORE'S MODEL "PACIFIC."

TO THE EDITORS *Model Railways and Locomotives*

DEAR SIRS,

Regarding Captain Moore's 4-6-2 design reproduced in this month's *Model Railways*, the first thing that strikes me very forcibly is the small grate area, and, owing to the extremely long barrel the amount of so-called heating surface at the smokebox end which will do no good whatever. Why not leave out the Wootten firebox, and then by using the ordinary type, carry the firebox forward to the driving axle, of course leaving clearance between throat-plate and axle for the eccentrics. By so doing the grate area would be increased by 150 per cent, and after all this is of far more practical use than gases. I am supposing that Captain Moore intends to use

liquid fuel, either Primus burner or spirit. The general outline, I think, is tip-top, and much neater, and more typical "British" than the "Great Bear."

Yours truly, "SHEFFIELD."

[The grate area could, we think, be brought up to standard proportions, owing to the wide Wootten firebox being used. However, for model purposes, a long rather than a wide grate is desirable.—EDITORS.]

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#### COLOURED GELATINE FOR SIGNAL SEMAPHORES.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIR,

Can Mr. W. H. Jubb inform me where he got the red and green gelatine for the signals described in your April issue. A reply through the medium of *Model Railways* will oblige.

95, Mildmay Road,  
Chelmsford, Essex.

Yours faithfully,  
D. MADGE.

The coloured gelatine used for signal semaphores was taken off the packets of sweets to be bought about Christmas time. If Mr. Madge has any difficulty in getting these, I will get same for him on his remitting stamps to cover postage.—W. H. JUBB, 64, Peveril Road, Sheffield.

---

#### ANSWERS TO CORRESPONDENTS.

J. C. (West Kensington).—Many thanks for photograph your friend took at Nancy.

Ottery St. Mary.—Will the reader residing here, and who recently communicated with us, write to Mr. H. G. Jobson, Redlands, Sidmouth.

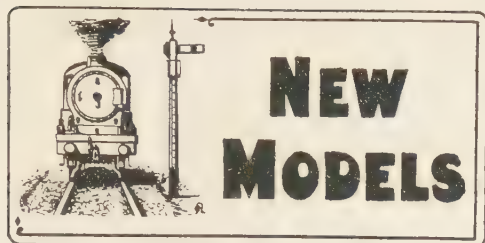
G. E. G. R. (Aldershot).—The four-cylinder G.W.R. locomotives are naturally a little larger and heavier than the two-cylinder engines. N.E.R. locomotive 1619 stands alone. See recent articles.

H. I. R. (West Australia).—Thanks for pictures of your model railway.

B. de N. (Tooting).—We do not know the S.E. & C.R. "car train." Perhaps a reader will oblige by identifying and describing it. The maximum speed would be about 60 to 65 miles per hour.

D.R. (Hartburn).—We should esteem it a favour to receive a larger and clearer photograph of your model station. The loco you mention represents good value.

H. T. A. (Upper Norwood).—We have no official particulars of the carriages mentioned.



### A NEW POINT LEVER:

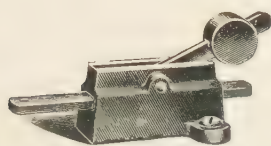
(For No. 0. and No. 1  
Gauge Railways.)

(Price 1/- each).

MESSRS. BASSETT-LOWKE, LTD., have just brought out a new point lever (as shown in the accompanying illustration) which is specially intended for small gauge railways. It is of extremely ingenious design, and is arranged so that the points are locked when pulled over fully in either direction.

The lever is sufficiently small to clear locomotives and carriages, in all gauges except No. 0, if placed transversely in the six-foot way of the new standard dimensions. In No. 0 gauge, if required between two sets of rails, it can be fixed longitudinally, and a bell-crank employed to produce the necessary transverse motion to the point rod.

The price is sufficiently low to bring it within the reach of all and enable the user to employ several of them without adding largely to the total cost of the line. This point lever is designed to suit both permanent way and "Lowko" track. The throw of the rod is  $\frac{5}{16}$ ".



### MODEL RAILWAY ACCESSORIES.

New engine sheds for No. 0 gauge on the lines of that illustrated in our issue of January and February last are now available. The cost of these model buildings is 15/6.

The price of the old-style buffer-stops described in last issue are—No. 0 gauge, 1/6; Nos. 1 and 2 gauges, 1/9; and No. 3 gauge, 2/-, post free. They are obtainable from Messrs. Hull & Sons and Messrs. Bassett-Lowke, Ltd.

### THE NEW AUTOMATIC LUBRICATOR FOR STEAM LOCOMOTIVES.

Almost all of our readers are aware that the new models of the "Black Prince" Midland compound and Great Western "County" class locomotives produced by Messrs. Bassett-Lowke, are fitted with a special lubricator in the smokebox, the door of which opens to get at the filling screw. The very latest models are provided with a regulating cock also. This "continuous" lubricator is connected direct to the live steam pipes, and if the regulator (starting valve) is closed, it is possible to refill the lubricator whilst the boiler is in steam. The tap on the latest models is marked, and when the handle points to mark "No. 1" the flow of oil is at the maximum; at mark " $\frac{1}{2}$ " the quantity passing through is reduced to the normal.

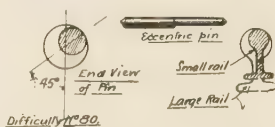
Just as we were packing our bag for Brussels, we received a sample "Tinol" soldering set. We popped it in, and feel sure that we shall be able to speak well of its usefulness in our next issue.

## READERS IN DIFFICULTIES.

### DIFFICULTY No. 80.—JOINTING DIFFERENT SECTIONS OF RAIL.

H. G. (Sidmouth) writes:—I find great difficulty in making a good joint between "Lowko" track and tin-plate rails, as the engine is apt to be derailed, especially the bogie. Can you help me out of this dilemma?

To make a satisfactory joint between two different sections of rail is always a troublesome matter, and there is no special method of accomplishing the desired result. As you perhaps know, the large size "Lowko" rail is exactly the same section as Bassett-Lowke's standard tin-plate track, therefore if it is intended to use the "Lowko" track



in conjunction with standard *tin-plate points*, then it is best to adopt the larger rail, although for anything below 2" gauge the rail section is rather too large. Where the small rail is employed in conjunction with tin-plate points, then the best method is to make some special pins for the ends of the rails as shown in the sketch herewith, in which the two ends—one for the smaller rail and the other for the larger rail—are eccentric to each other in the direction of  $45^\circ$  to the horizontal. The thickness of metal in the respective rails is about the same, and therefore this method provides a fairly good joint at the vital spot in the section of the rail.

### DIFFICULTY No. 71.—TIN RAIL FOR OUT-DOOR USE.

H. B. (Colchester) writes:—I have a No. 0 gauge tin-plate railway, and I am going to fit it permanently out-of-doors. Can you suggest any better way of preventing the rails from rusting than painting them over with galvanizing paint? Would a large radius engine like the L.N.W.R. tank loco take a standard set of four points?

Tin rails are quite out of question for out-door use. The next best thing to scale model permanent way is "Tessted" steel rail, and after this comes the "Lowko" rail in brass. Obtain some of the material, which is very cheap, and lay some on boards. Put the boards in the position the track will occupy and see how the weather affects it. The L.N.W.R. clockwork tank will not take the curves of the "set of four points" referred to. They are laid to the small radii.

### DIFFICULTY No. 82.—LENGTH OF INNER AND OUTER RAILS.

D. R. (Yorks) writes:—Please would you through *Model Railways and Locomotives* answer this small question? What in a No. 0 gauge railway on a 6' curve with 16 pieces to the circle is the correct length for one piece on the other circle and also of one piece on the inner circle?

We are not quite clear as to the exact terms of your query, but presuming that you wish to know the difference in length between the inner and outer rails of a 6' circle of No. 0 gauge, we may say that this can be settled quite easily by arithmetic. The difference in diameter over the inner and outer rails is twice the gauge. Therefore in No. 0 gauge the circumference of the outer rail is  $3\frac{1}{2}$  times 6' and the inner rail  $3\frac{1}{2}$  times  $5' 9\frac{1}{2}"$ . Divide the respective products by the number of pieces and you obtain the length.



# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 6.

JUNE, 1910.

## BETWEEN OURSELVES.

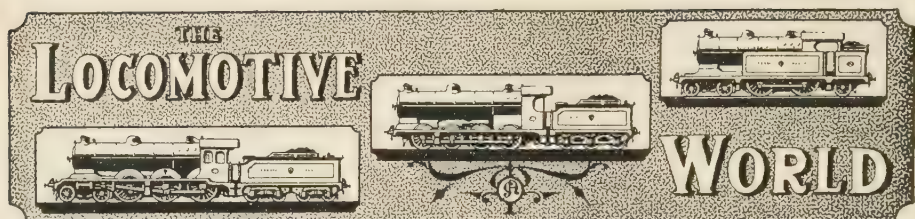
OUR first duty is to call attention to the special "Great Northern Railway issue" which we are now getting ready for July. The whole of our journal, as far as is practicable, will be devoted to Great Northern Railway practice—both real and model—and we can promise our readers that the issue will be the best that we have published. Should any reader have interesting models of Great Northern locomotives, rolling stock or stations, we shall be glad if they will send photographs and particulars along. We shall go to press on June 11th. The issue will be larger than usual and full of most useful drawings and photographs. To prevent disappointment, readers are requested to order it at once from their local newsagent.

We have practically decided to reprint the January, 1909, issue, but will let our readers know as soon as it is ready. Owing to the comparatively very limited number we shall require to print, the price may be 6d. per copy. However, we are prepared to oblige our readers who are minus this issue, even if it involves us in some financial loss.

So much has been said in eulogy of our late King Edward and his life's work, that the little we could add is hardly worth considering. It is only a few months ago that we read of King Edward taking a ride on the miniature railway at Eaton Hall—and now he is gone! In connection with progress in science and engineering during the period King Edward occupied the throne, it is worth noting that the growth of popular interest in model railway work, and likewise the development of the commercial side of it, synchronises with the reign of his late majesty almost exactly. We hope it will continue to expand in the same degree.

IN MEMORIAM  
**KING EDWARD THE SEVENTH.**

Died 6th May, 1910,  
after a short but glorious reign.



## THE EXPRESS LOCOMOTIVES OF THE NORTH BRITISH RAILWAY.

BY CECIL J. ALLEN.

IN further northward continuation from our locality of consideration in the last three articles of this series, we now turn briefly to the locomotives of the northernmost partner in the working of the East Coast Route—the North British Railway. It would be hard to find a line more hampered in every possible respect by the difficulties of grading and alignment which, in every direction, furnish an insuperable obstacle to the booking or maintenance of high speeds. Between Berwick and Edinburgh steep gradients abound, including one of 1 in 96 for four miles continuously near Cockburnspath, although the express trains over this length are invariably worked through to and from Edinburgh by the locomotives of the North-Eastern Railway. Between Carlisle and Edinburgh—the “Waverley” route through Hawick and Galashiels—two mountainous summits require to be negotiated, both in the neighbourhood of 900 feet above sea-level. From Edinburgh to Dundee and Aberdeen the line is a constant switchback of steep grades, varied frequently by an irritating sequence of service speed reductions for curves, which make any continuous stretches of fast running impossible. The only stretch of comparatively level line is that between Edinburgh and Glasgow, although this concludes with a down-grade of 1 in 40—the famous Cowlairs incline, worked until recently with a stationary engine by means of an endless wire rope—into the Queen Street terminus at the latter city.

In consequence of these difficulties, the North British Railway does not loom very largely in the public eye as regards speed achievements, and there is not, in fact, any booking at present in force on this system at as great an average speed as 50 miles per hour. The famous Edinburgh-Aberdeen three-hour service, instituted in 1906 as a reply to the Caledonian “Grampian Corridor” express trains, and accompanied by the introduction of a series of huge “Atlantic” locomotives and palatial new corridor restaurant car express trains, has now by degrees fallen to 3 hours 16–19 minutes, a deceleration aided somewhat by the friendly relations existing between the two great companies of recent years. The present timing no doubt conduces to a better observance of punctuality, but an average speed of 39.9 miles per hour in the case of the fastest train, with only three stops, certainly does not seem a very brilliant performance in these days of “hustle.” A 60-minute train service between Edinburgh and Glasgow—47½ miles—was tried for some time, but is now altered to 65 minutes. The fastest timing on the “Waverley” Route is one of 2¼ hours for the 98½ miles. Apart entirely from speeds, however, the fact that the North British is the partner in two of the Anglo-Scottish routes—the East Coast and the Midland, as between London and Edinburgh only in the latter case—in addition to the

possession on its system of two such monuments of engineering skill as the Forth and Tay Bridges, would entitle the North British Railway to a measure of popular interest.

As regards locomotives, the 4-4-0 type was the standard for express service on the N.B.R. for many years, developing gradually in size under the Stirling *régime*, and, later, under that of Mr. Matthew Holmes, into a size and power equal, or even superior, to that of most of the British designs at the beginning of the present century. Mr. Holmes' last design, which we

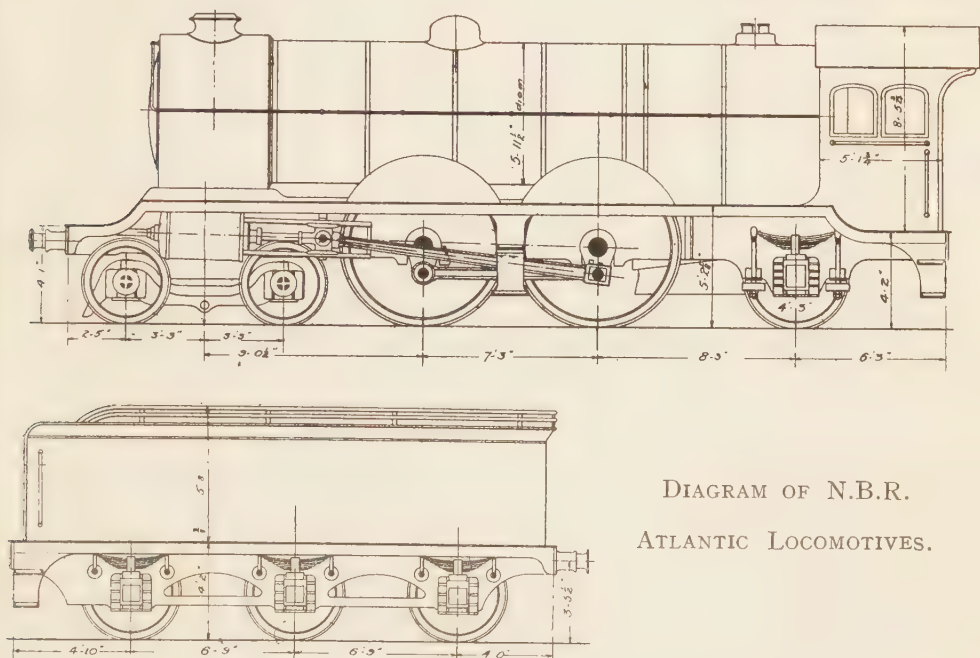


DIAGRAM OF N.B.R.  
ATLANTIC LOCOMOTIVES.

may take as representative of N.B.R. practice previous to the introduction of the "Atlantics," had the following dimensions. The cylinders were 19" diameter by 26" stroke, and the coupled wheels 6' 6" diameter, spaced at 9' 6" centres. The bogie wheels were 3' 6" diameter, and the total engine wheel-base 23' 7". The boiler was of ample proportions, providing a heating surface of 1,577 sq. feet, and working at the noteworthy pressure for that period of 200lbs. per sq. in.; the grate area was one of 22 1/2 sq. feet. The weight of the engine in working order was one of 52 tons, of which 34 tons were available for adhesion; the total weight of engine and tender, the latter loaded with 7 tons of coal and 3,525 gallons of water, was one of 92 tons. One of the leading features of these fine engines was the provision for the first time of a large and commodious cab, with a window in each side-sheet, in place of the miserably inadequate erection previously furnished on the express engines of this line.

The acceleration of the Aberdeen service in 1906 called for increased locomotive power, and, as a reply to the Caledonian "Cardean" class, a



series of immense "Atlantic" locomotives was constructed by the North British Company to the designs of Mr. W. P. Reid. It seems hard to understand why the 4-4-2 type should have been selected in preference to the 4-6-0 type, when the appalling gradients of the N.B. system are taken into consideration. These engines marked an era in Scottish locomotive con-

#### NAMES AND NUMBERS OF N.B.R. ATLANTICS.

|                       |                      |
|-----------------------|----------------------|
| No. 868, Aberdonian.  | No. 875, Midlothian. |
| „ 869, Dundonian.     | „ 876, Waverley.     |
| „ 870, Bon-Accord.    | „ 877, Liddlesdale.  |
| „ 871, Thane of Fife. | „ 878, Hazeldean.    |
| „ 872, Auld Reekie.   | „ 879, Abbotsford.   |
| „ 873, St. Mungo.     | „ 880, Tweeddale.    |
| „ 874, Dunedin.       | „ 881, Borderer.     |

struction on their introduction; they were the first "Atlantic" locomotives built for any Scotch line, while they were also the first Scotch locomotives to appear with a Belpaire firebox. In addition to this, the huge boiler provided, pitched at 8' 11" above rail level, reduced the mountings to the smallest size ever yet seen in this country, with the possible exception of those employed on the famous Great Eastern "Decapod" in its original form.

The dimensions of these mammoths are as follows:—The heating surface of the boiler, which works at a pressure of 200lbs. per sq. in., is no less than 2,256 sq. feet, and the area of the fire-grate 28½ sq. feet. The cylinders have the large diameter and stroke of 20" and 28" respectively, and are placed outside the frames. The coupled wheels are 6' 9" in diameter, the bogie wheels 3' 6" and the trailing wheels 4' 3". The weight of the engine in working order is 74½ tons, of which 40 tons rest on the driving wheels; the coupled wheel-base is one of 7' 3", and the total wheel-base of the engine 27' 9½". The tender is of exceptional size for carrying on six wheels; 7 tons of coal are carried, and 4,240 gallons of water, making up the total weight to 45½ tons. The engine and tender together thus weigh 120 tons in working order. Among the fittings might be mentioned Smith piston valves, with collapsible segmental rings, placed inside the frames; automatic air and vacuum-destroying valves with lubricator, whereby steam and oil are admitted to the cylinders when the engine is running downhill with the regulator closed; the Westinghouse brake with a vacuum ejector for working vacuum trains; steam reversing gear with auxiliary reversing handle; air sanding apparatus; and steam-heating apparatus for trains. The lines of the lower portion of these engines are very graceful, and, had the boiler been slightly reduced in its dimensions in order to allow of more sightly boiler mountings, there is no doubt that they would have ranked among the most handsome locomotives of the present day. Fourteen of this type are now in service.

After a prolonged experience of the working of "Atlantic" locomotives, on the need arising for additional locomotive power during last year, the N.B. management renewed its allegiance to the 4-4-0 type, and constructed a series of engines of size and power superior to any that they had previously employed. In general dimensions and appearance they compare fairly closely with the 4-4-0 engines previously described, having the same cylinder and wheel dimensions. The boiler, however, is much larger, having a heating surface of 1,618 sq. feet, but is worked at the reduced pressure of 190lbs. per



sq. inch. The area of the grate is also less, being only 21 sq. feet. The weight of these engines in working order is one of 55 tons, of which  $36\frac{1}{2}$  tons are available for adhesion. The tender is identical with that supplied to the "Atlantics," carrying 7 tons of coal, and 4,235 gallons of water. In common with all Mr. Reid's locomotives, these engines differ from previous designs in having the safety valves placed above the firebox, instead of on the dome. The locomotives of the North British Railway are painted brownish-olive colour, with a lining of yellow, black and red in this order. Their general outline is both handsome and massive, while their simple external design renders them exceptionally suitable prototypes for the model locomotive designer.



BY CECIL J. ALLEN.

THE further series of articles now commencing form in reality a continuation of the article which appeared in the January, February, and May issues of *Model Railways* last year, under the same title. It is my intention, having dealt in the previous series with what might be termed the "first principles" of signal construction and working, to now describe and illustrate the types of signals employed by each of the main trunk lines in detail, laying stress on those constructional features characteristic of each line, which render the naming of a railway by a casual glance at its signals a matter of perfect ease to the trained observer. Most of the differences between the signals of the different railway companies lie in matters of insignificant detail, but it is well for the reader whose miniature line is modelled on that of a definite prototype, and who wishes to have as perfect a representation of the original as possible, to see that every detail from rolling stock downwards is correctly reproduced. The accompanying further series of articles and illustrations may help him as regards signals and signalling work, and we shall consider the practice of each line in turn.

#### (1) GREAT WESTERN RAILWAY.

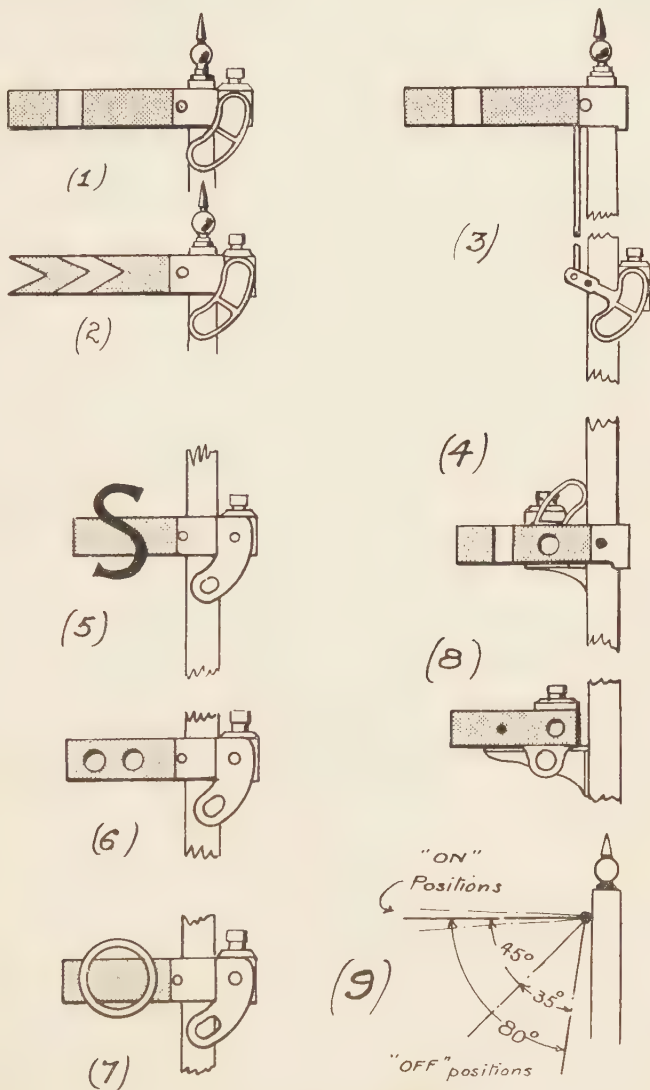
If a multiplicity of different types of signals makes for perfection in signalling, then the Great Western Railway should with ease take the premier place in this respect in the United Kingdom. Nine different types of signal-arms in all are provided to serve different purposes, the general design of the arms, posts and fittings being neat and workmanlike. Fig. 1 shows an enlarged detail of a standard G.W.R. home signal-post and arm, from which it will be seen that the spindle of the arm is carried in brackets at the side

of the post, instead of through the woodwork itself. A characteristic feature of the spindle casting, to which the arm is attached, is its square shape, resulting in a sharp corner being visible at the uppermost end of the arm, against the post, when the arm is pulled off. The spectacle is attached to the lower right-hand corner of the casting, instead of being cast solid with it, as is often the case. A small and compact finial is fitted to the top of the post. A similar form of signal is used as a starting signal, except that, as the post of the "starter" is usually considerably shorter than that of the "home," a correspondingly shorter arm is fitted.

The distant signal (Fig. 2) is of similar construction, but the white and black stripes on the arm are forked to correspond to the dove-tailed end of the arm. It will be noticed, also, that the green portion of the spectacle is smaller than the red, the object of this being that the green light shall not show unless the signal is pulled well off. The angular portions of the arm between which the green light is fully visible in the latest patterns of distant signals are from  $55^{\circ}$  to  $80^{\circ}$  below the horizontal, thus obviating any possibility of the signal showing "clear," for instance, in the evening after a hot day when, perhaps, the long wire from the box had contracted after the evening fall of temperature, and had pulled the "distant" out of the horizontal position unknown to the signalman. Where electric repeaters are fitted to the signals, they are arranged to show the signal "on" when it is within  $5^{\circ}$  above or below the horizontal position, and to show it "off" from within  $45^{\circ}$  to  $80^{\circ}$  below the horizontal, thus ensuring that the signal shall be correctly off for "line clear." This practice of pulling signals off to an acute angle with the post is in marked contrast to that obtaining, for instance, on the L. & N.W.R., where it is a rare occurrence to see a signal pulled off to a greater angle than  $45^{\circ}$ , or sometimes more than even  $30^{\circ}$ .

In cases where a very high post is employed, the arm being over 30 feet from ground level, gear is generally provided to hoist the lamp from the ground to the arm level, in order to save the expense of carrying the ladder to the top of the post, and also to save the men the trouble of climbing to such a height when attending to the lamp. Occasionally, however, in cases where the arm has to be placed at a great height in order to clear some object in the immediate background, and where the lower portion of the post is not obscured, the lamp is fixed on the post at a point lower than the arm, as shown in Fig. 3. In such cases the spectacle is worked from the balance rod. No lamp is fixed in position at a higher level than 30 feet above ground. In similar cases of high posts, or where a bridge or other structure obscures the near view of the signal, a duplicate arm is usually provided near the base of the post (Fig. 4). In order that the lamp may not be foul of the usual clearance allowed from the running rails to the post, it is placed on the opposite side of the post behind the arm. A small hole is cut in the arm to receive the red portion of the spectacle, while the green portion is fixed on above the arm. This reversal of the relative positions of the red and green being necessary, seeing that the spectacle is on the opposite side of the pivot.

For shunting purposes, and for working in and out of loop and siding roads, four distinct varieties of signal-arms are in use, in addition to the usual ground discs, to which I shall refer in later articles. For an indication to a train to shunt, when it has come to rest at a home or starting signal, a short arm fixed lower on the post is provided, crossed with a large white letter S in place of the usual stripe (Fig. 5). As a direction to move backwards



## GREAT WESTERN STANDARD SIGNALS.

1—Home signal.  
 2—Distant signal.  
 5—Shunting signal.  
 6—Backing-out signal.  
 7—Siding signal.

3—Tall signal.  
 4—Duplicate arm.  
 8—Facing siding signal.  
 9—Angles of arm.

on the same line, an arm of the same size is used, but with two round holes cut in it in place of the S (Fig. 6). For giving permission to start from a siding or loop reception line the ordinary form of siding signal common on other lines is used—a short arm having fixed on it a round white ring (Fig. 7). The spectacles of these three signals are all of the same character—the casting is solid with the spindle casting of the arm, and has a small hole left open in the centre to receive the red glass. A larger oval hole in the lower portion of the spectacle receives the green glass, both red and green lights, however, being much inferior in size and brilliancy to those of the main signals, and being thus distinguishable. One further type of signal is provided (Fig. 8); this gives direction to enter a loop siding or reception road, approached from the main line through facing points. A small bracket is fixed to the main signal-post near the base, carrying the short arm, pivoted in the centre and the lamp. A small hole is bored in the arm and fitted with red glass, while a projection on the lower side carries a small green glass, the arm and this diminutive spectacle being made in one piece. This arm is somewhat similar in external appearance to the “calling on” or “draw ahead” arms fitted on the L. & N.W.R. and other lines.

The signalling system of the Great Western Railway may seem to present some complexity to the uninitiated observer, owing to the large variety of signals employed, but the careful classification of train movements by this means is a most undoubted advantage in working. The real difficulty, however, is that of showing the corresponding variety of lights at night, this being an obstacle of the same order as that experienced by the L.B. & S.C. Railway in adequately replacing the multiplicity of engine discs in use during the daytime by lamps at night. The only other argument against the Great Western system of signalling is the old one of complication, the variety of signals in use presenting a marked contrast to Great Northern practice, for instance, where one home and one distant signal pattern suffices. Curiously enough, the same contrast is found equally in the locomotive designs of these two railways, the Great Western apparently aiming at multiplication, while the Great Northern aims at standardization.

*(To be continued.)*

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It is pointed out that M. Paulhan's time for his great flight from London to Manchester was considerably less than that of the average train, and only 41 minutes more than that of the fastest express now running, as the following figures show :—Average time of sixteen regular daily trains, 4 h. 26 min.; the fastest express journey, 3 h. 30 min.; M. Paulhan's actual time in the air, 4 h. 11 min. A London & North-Western train was in attendance on M. Paulhan throughout his journey, the route of which was practically identical with that of the company's line from London to Manchester.

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Readers of the magazine in or near Halifax will no doubt be aware that the miniature railway round the Zoo and Amusements Park at Chevin-edge, Halifax, is now in full working order.

The track at Sutton Coldfield Park, near Birmingham, has been laid with a heavier section of rail, and the engine “Mighty Atom” has now returned to its duties.



# Carriages & Wagons



## BUILDING MODEL PASSENGER CARRIAGES.

BY JAS. MACKENZIE.

(Continued from page 153.)

AFTER this part has dried, the blocks J and K may be glued in place—about four or five to each side will be quite sufficient; they must be cut to a true right-angle on the surface which adjoins the coach roof and sides. When fitted, cover each one with hot glue, and, pressing well into place, move slightly back and forth until the glue is squeezed out; drive two panel pins into each, and lay the whole aside again to dry.

We will now take the lower portion in hand. Pick out the two ends, the two lower sides and the bottom; cut these two lower sides to the exact length as shewn on the constructional drawing—this is the length of the coach minus the thickness of the two ends. Be sure that they are quite

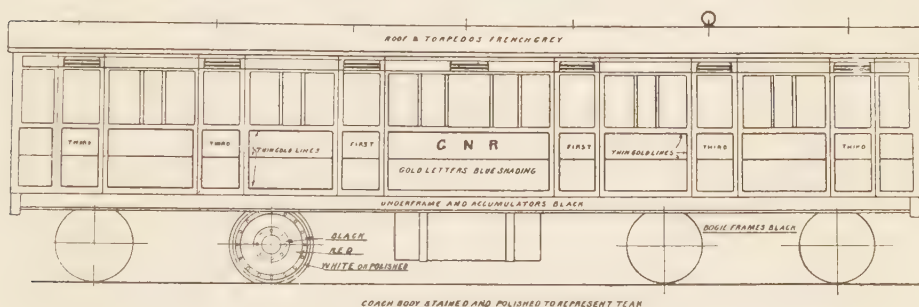


FIG. 7.—PAINTING, LINING AND LETTERING DIAGRAM, MODEL G.N.R. PASSENGER CARRIAGE.

square with the top and bottom edges; this is most important, and is quite worth taking the time and trouble to ensure accuracy. Before doing this, take a shaving off the top and bottom to ensure smooth edges and parallelism. Now glue one end and the corresponding edge of the end piece and rub well together as before; repeat on the other side of the same end and the side piece, and rub well together. When gluing up, be careful that the rebate for the glass in the side and the end correspond, otherwise you will not be able to get the glass in place when the time comes to try this part of the work. Now repeat all through with the other end piece and drive a few panel pins in each joint, Cut four blocks similar to those in the roof, glue them one in each corner, see that the whole is square, and if so, lay aside to dry.

Now let us turn again to the roof, which will now be dry; cut the ends until the top is exactly the right length to fit in between the ends of the

lower portion of the coach, and see that they are cut quite square with the sides. It may be as well to point out here that too much stress cannot be laid on the importance of getting every part square as the builder goes along ; every piece must be square and true before being glued up, for if this is not done the builder will most likely find himself with a coach body which, when finished, will be only fit to be covered with paraffin and used as a fire-lighter.

Having cut the top to fit, now take the glass and fit it into the rebates in the lower portion of the coach ; if it goes properly home into the rebates, try the top on and see that it comes down to its right position, that is, so that the top of the roof comes flush with the top of the ends as shewn on the constructional drawing, fit the glass in both sides, make sure that the window spaces are the same width at both ends and both sides ; also be careful that the glass is not too tight a fit in the channels, or disaster will be sure and certain—the glass will crack when the coach is laid aside during the painting, if not before.

Having made the top a perfect fit between the ends and fitted it properly to the glass, it can now be marked, taken to pieces, and the joints at the end glued up—of course after being warmed up as with the first joints. No glue should be put into the rebates for the glass. Put the whole together and clamp endwise. If the builder possesses no clamp large enough to take the coach endwise, he may simply tie it up firmly with strong twine wrapped round from end to end. A few long fine pins may now be driven in round the ends into the roof, top rails and sides. Lay aside to dry for at least twelve hours : this will ensure a strong joint.

We can now take the bottom in hand. Plane the two sides quite parallel until they are an exact fit into the rebates cut in the sides. Trim one end quite square, and then cut off square and to the length necessary to make a good fit between the ends. This part will not be glued in, but screwed with six or eight screws through into the sides, so that the bottom can be removed when the coach is finished in order to clean the windows. No matter how much care is taken in building, dust will accumulate inside the coach, and if the bottom is glued on there will be no way of removing it.

Now the upright pieces to form the spacing between the compartments may be taken in hand. Cut the ends quite square so that they will be a good tight fit between the top rail and the bottom side. This fit is most important, as if they are too easy they will at a later period fall away from the coach altogether. It is on the fit on the ends that form the glued joints that their security depends ; when they are correctly fitted glue them in and give time to dry. When all these are quite dry, we may proceed to get the coach down to the proper shape externally. Mark off the roof curves, and the curves in the lower sides, very carefully and accurately on each end, and then pare the greater part of the surplus off with a sharp chisel, finish with the plane, and then sand-paper all over with a sheet of No. 1 sand-paper wrapped round a cork pad about 4" x 6". After this, go all over it again with No. 0 or 00 sand-paper. Be careful that the sand-paper is wrapped tightly round the cork pad ; if not the edges will be found to round off, a thing which will effectively spoil the appearance of the coach. It is essential in finishing that the sides be smooth and flat and the corners and edges sharp and distinct. The strip on the end to represent the weather strip as shewn on the constructional drawing, may now be fitted and glued on, and secured by a few very fine brads. The overhang of the roof at the ends

will be found a little more difficult. These pieces may be about  $\frac{1}{8}$ "  $\times$   $\frac{1}{8}$ ", and where bent to a very small radius may have saw cuts on the inside about three-parts through, which will simplify matters considerably. These will be fixed with glue and fine pins as beforementioned, and when dry they must be sand-papered to the final shape and finish. The ventilators over the door may now be trimmed up to shape and fixed in place with glue and a few fine pins.

The only thing now to be done to the body is to mark the doors, that is, the joint on each side of the door. These lines should be cut in with a very sharp knife pretty deep and wide, so that they will not become filled

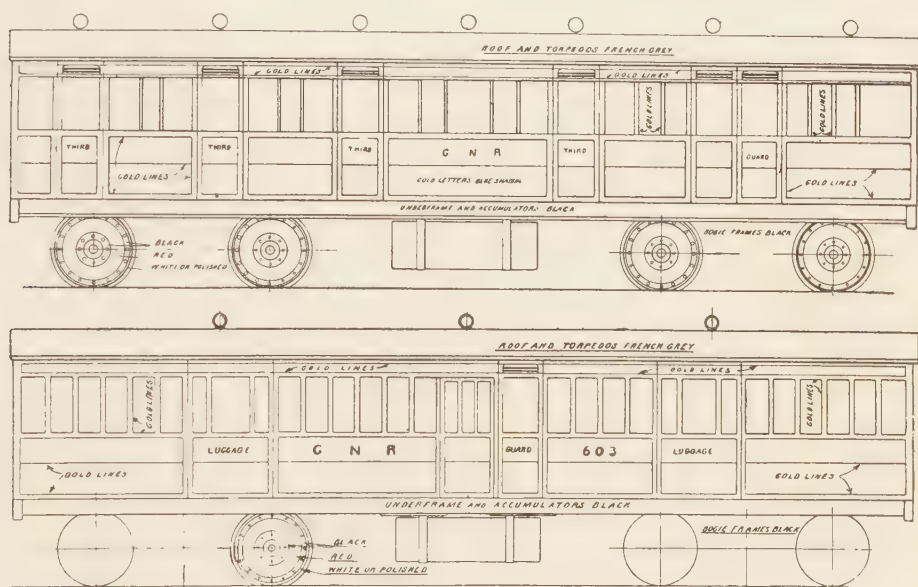


FIG. 8.—PAINTING AND LINING DIAGRAM FOR FINISHING MODEL BRAKE THIRD, AND GUARD'S VAN, IN G.N.R. COLOURS.

up when painting. With a fine nail punch drive all the pins below the surface, and touch the holes with a drop of paint of a suitable colour, or boiled oil, and putty up; this will absolutely prevent the paint falling out later when the coach is dry.

The underframes should now be taken in hand. These are very simple, the chief thing to look to is that they are put together square. The headstocks are glued and fixed with some of the long pins, about two to each solebar, and the transomes for carrying the bogies will also be fixed with glue and screws in each end through the solebar, as shewn on the constructional drawing. See that the top is quiet flat, and lay on the bottom of the coach, fix on with long screws about two to each headstock and three in each solebar.

The bogies may now be put in hand. These are quite simple to make up, but are very effective in appearance indeed when finished. The transome should be filed up on the sides where the solebars are fitted, so that the latter lie quite upright when the bogie is laid bottom up on a surface plate



or slab. Two  $\frac{1}{8}$ " countersunk screws are fitted in each side and into the centre of the transome. The ends have no fixing, but lie quite close to the transome. Screw these screws up quite tight, and lay the bogie on the surface plate, or, failing this, the face plate of the lathe. Rub chalk on the inside of the solebars, and with a surface gauge the horizontal centre line of the axleboxes should be marked on the inside of the solebars. Now take the bogie to pieces, and with a pair of dividers mark the vertical centre line across those lines already drawn. Make quite sure that the centre line is exactly similar on both sides. Centre punch where the lines cross, and drill to within  $\frac{1}{16}$ " of going through with a  $\frac{5}{32}$ " drill, file off any irregularities, and screw together again. Now bore and face the wheels and reamer out  $\frac{3}{16}$ ". Centre the axles and proceed to turn up the wheel seats to a tight driving fit. Drive the wheels on, taking great care not to damage the centres, turn up with light cuts on a slow speed. Most amateurs make the mistake of running much too fast when turning cast iron. To make a nice job the speed should err on the slow side, not the fast. Polish them on the treads and the flanges, and turn down the journal on the end of the axle to  $\frac{1}{8}$ " or slightly under. Turn this up to the boss on the outer side of the wheel, leaving a slight radius at the neck. Be sure that the axle journal is at least  $\frac{1}{32}$ " slack in the hole on the solebar, as shewn on the drawing, to ensure some flexibility in running. For the same reason the hole in the transome for the pivot screw should be at least  $\frac{1}{32}$ " larger than the screw which goes into the rubbing plate. Make sure also that the wheels have at least  $\frac{1}{16}$ " end play when the axles are fitted into the bogies. This concludes the bogies, which can now be taken to pieces for painting.

The accumulator box brackets can next be taken in hand, and will present no difficulties. They are simply bent up from the brass rods provided for the purpose, which should be bent up as shewn on the drawing, and the accumulator boxes fixed to them by screws before they are fixed on the coach. The torpedoes and handles should not be put on until after the painting is complete, but the holes for them should be bored in the correct positions before the painting is begun. The painting is now the next process. The best results are to be obtained by using paint freshly made from pure white lead. On no account should enamel be used, as it is much too thick. The paint must be mixed up thinly and the correct depth of colour obtained by using successive coats, always taking care that the previous coat is dry before applying the next one. Never omit to rub the coach down with very fine sand-paper between every coat; this is most important if an absolutely smooth surface is desired. From four to six coats should be put on, but as already mentioned the paint must be very thin. In mixing up the paint only the best genuine English white lead should be used, with turpentine, and just the very smallest suspicion of patent driers. This is for the white. To obtain any colour, purchase from any first-class paint stores a small quantity of the required colour ground in turpentine, and mix with the white paint until the required tint is obtained.

When the last coat has dried quite hard, rub carefully all over with smooth sand-paper, and we are now quite ready for the lining and letters. The lines should be drawn on with the aid of a chalk line, as this can easily be rubbed off after all is dry. For the lines the gold paint sold in shilling bottles by most respectable paint stores will do very well indeed. This should be put on with a fine soft pen. Half-an-hour's practice on a piece of prepared and painted wood will give one surprising dexterity in the



production of straight lines. All round corners will have to be put in with a very fine sable or camel hair brush, and here again the amateur should practice on the piece of painted board aforementioned. After all the lines are put on according to the painting drawing, stand the coach in a dry place absolutely free from dust until thoroughly hard, and varnish with the very finest coach or carriage varnish. One coat should be sufficient; this should be allowed a week to harden before attempting to put the fittings on. These of course will go in the holes already bored when they were fitted, and will give no trouble. Fit the bogie on the underframes as explained earlier, also buffers, draw-hooks, springs, etc., then fix the underframe on the coach. Now fit the door and commode handles in the exact position shewn on the drawing. The fixing of the torpedoes will complete the vehicle. It should be laid aside for quite another week, so that the paint and varnish may harden perfectly: it is not sufficient that the surface should be dry, but it must be quite hard, otherwise the slightest pressure of the finger will make a mark on the finished surface. The coach is now complete, and if these directions have been adhered to, is, as far as outward appearances are concerned at any rate, a perfect *scale* model, and when the amateur comes to reckon up his expenses, it will be found that it is one of the most reasonably priced pieces of scale rolling stock which so far has been put on the market. These remarks on the construction applies equally well to almost any model coach, following the lines of our principal railways. These parts are at present put up to make into the following style of coaches:—

L. & N.W. composite 1st, 2nd and 3rd class main line coaches.

L. & N.W. composite 1st and 3rd class brake end coach.

L. & N.W. luggage and brake van.

G.N.R. composite 1st and 3rd class main line coaches.

G.N.R. composite 1st and 3rd class brake end coach.

G.N.R. luggage and brake-van.

These same coaches may of course be painted any other colours, such as C.R., N.B., C.C., M.R., N.E., East Coast Joint Stock or West Coast Joint Stock, as the design in the main of all these is very much alike, the principal differences being in the colour and arrangement of lining. Indeed they could be painted to represent almost any British railway coach stock of the same type, and when finished they would be quite correct.

A very nice model train can be made up with the coaches arranged as follows:—First a luggage and brake van next the engine, then two composite 1st, 2nd and 3rd coaches, next a composite 3rd and guard's brake end, will finish a train which will be short enough to get round any curves, not too heavy or unwieldy to pull, and yet look complete and effective. These coaches are quite unlike any of the other scale coaches that have been put on the market for amateurs to build up from time to time, some of them made up from metal parts or metal and wood. There is no other material which will give quite the same result when finished as wood. A coach made from proper hard-wood parts has a good appearance—a correct scale appearance as it were—which it is quite impossible to obtain in metal of any kind. In fact nothing but wood can possibly be used for a good class coach; no castings, however fine, can possibly have the same look or feel, nor can they be finished up with the same smooth glossy finish, not even with the aid of enamel. It is an indisputable fact that enamel is quite unsuitable for a coach finish; it is too thick, and tends to destroy the sharp edges and corners too much to present the correct appearance.

## A NEW GYROSCOPIC MONO-RAIL TRAIN.

ONE of the most interesting railway inventions with which we have ever had to deal is the gyroscopic mono-rail train recently patented by M. Peter Schilowsky, Governor of Kostroma, a large province on the Volga near Moscow. This practicability of invention was demonstrated by His Excellency, with the working model shown in the accompanying photographs and

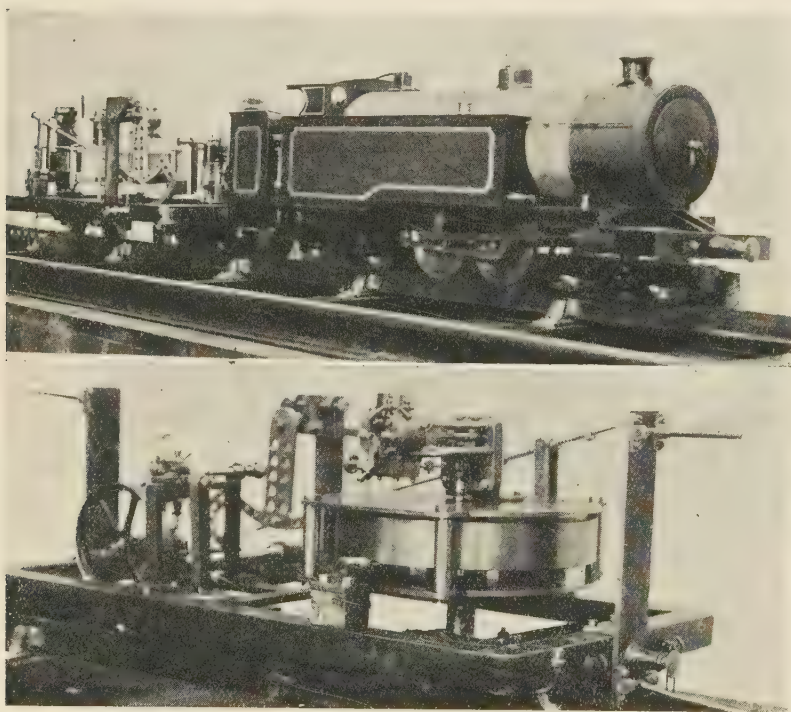


FIG. 1.—MODEL LOCOMOTIVE AND GYRO CAR.

FIG. 2.—MODEL GYRO CAR WITH BODY REMOVED TO SHOW THE MECHANISM.

drawings herewith, at the Westminster Palace Hotel, on the 4th May. The design provides for a stabilising gyrostator in the tender (on the loco where a tank engine is employed) and also on several special gyro cars in the train, the ordinary vehicles having no special apparatus, but being kept upright by means of special couplings fitted to the locomotive and gyro cars.

The gyrostator is a moderately large one which runs at a comparatively low speed, and therefore in contradistinction to other systems, does not

require to be placed in a vacuum casing. The gyro wheels can be operated by steam from the loco or by electricity according to which motive power is used on the particular railway equipped with the invention.

The model is especially interesting in that it is a working model, and absolutely self-contained and self-actuating. The boiler locomotive not only provides steam for its own cylinders, but also supplies through flexible pipes the steam for the  $\frac{5}{8}$ "  $\times$   $\frac{5}{8}$ " Stuart "Simplex" high-speed engine, which operates the 8" gyro wheel and the  $\frac{3}{4}$ "  $\times$   $\frac{5}{8}$ " engine which drives the stabilising mechanism. At the Press demonstration it worked exceedingly well all day.

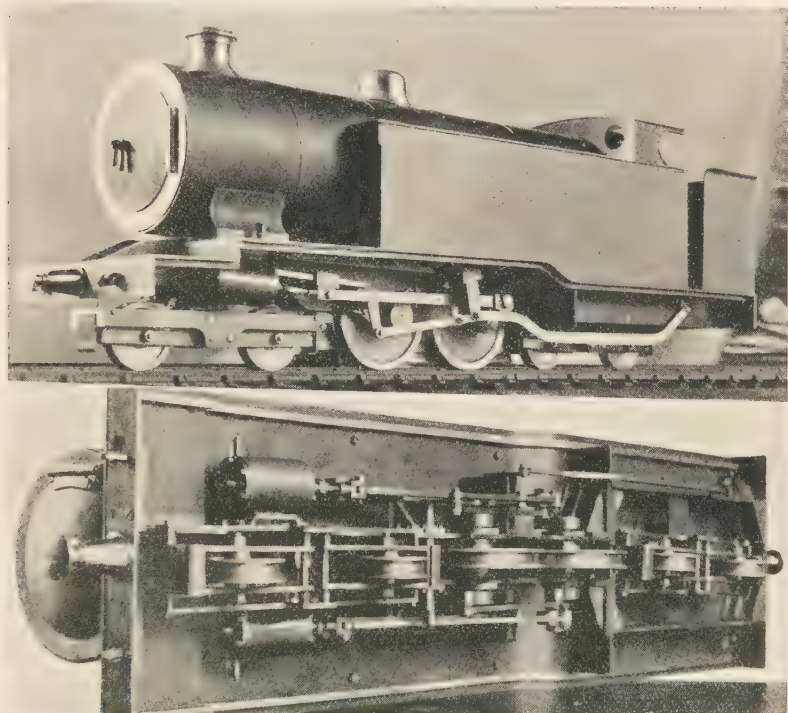
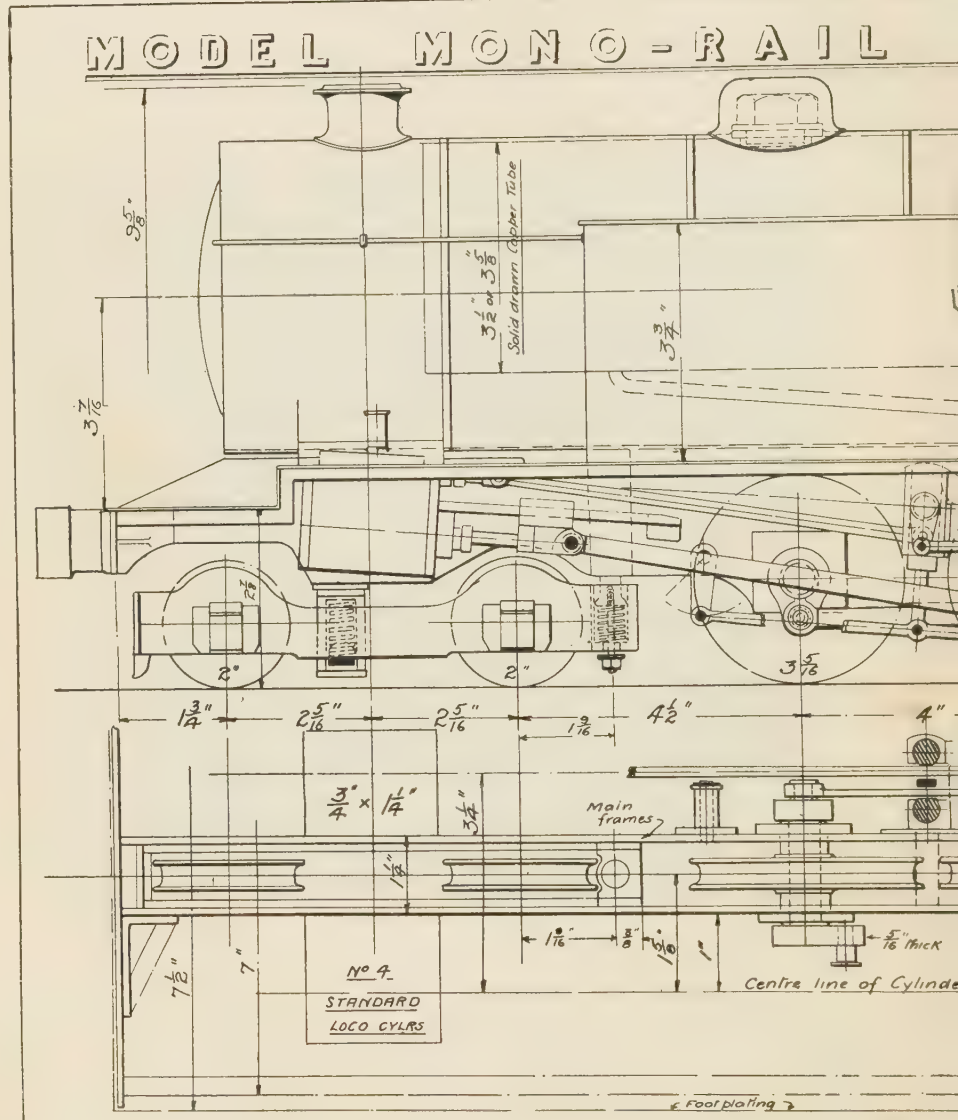


FIG. 3.—MODEL LOCOMOTIVE BEFORE PAINTING.

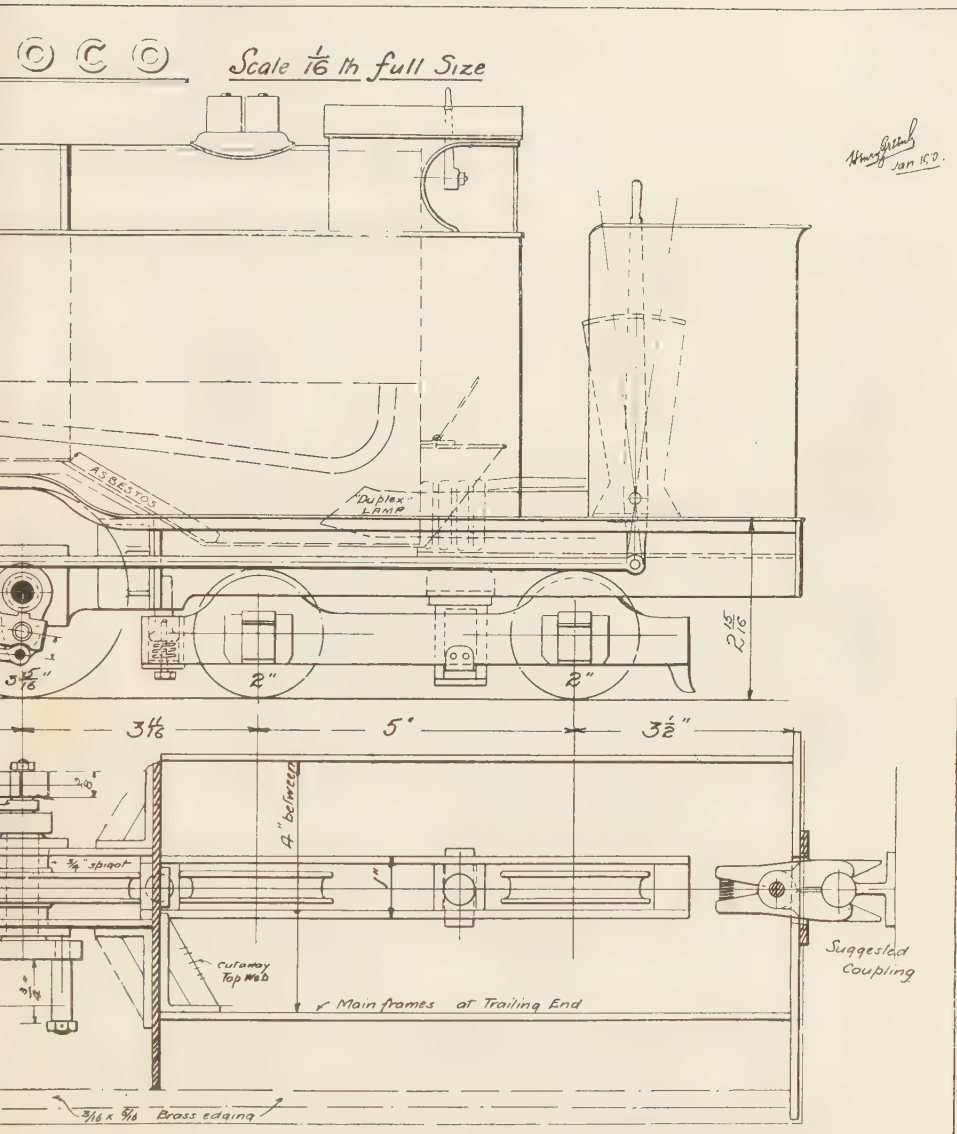
FIG. 4.—VIEW OF THE UNDERSIDE OF THE MODEL, SHOWING MECHANISM.

The model locomotive is of the  $\frac{4-4-4}{T}$  type designed on standard lines. It has nothing uncommon or wierd about it. It is of a type which would make a very good narrow gauge model and enable the user to obtain the maximum power on the minimum gauge and curves.

The boiler is comparatively very large, and is fired by a "G.B." petrol blow lamp of the "Duplex" type. The reservoir is carried in the bunker, which is made readily removable. The boiler has an inner barrel  $3\frac{1}{2}$ " diameter and eight water-tubes and a large superheater. The valve gear is of the Heywood type, fully corrected, and derives its motion from the big end. It has proved very successful, and gives a good distribution and beat.







### A NEW SIGNALLING INSTRUCTION MODEL FOR THE L. & N.W.R.

THIS model is somewhat similar to those made for the Great Western Railway a few years ago, but the gauge is  $2\frac{1}{2}$ " instead of  $3\frac{1}{4}$ ", the permanent way material being of the large size. The reduction in gauge enables more proportionate rolling stock and better curves at the various points and crossovers.

The table on which the model is laid is 20 feet long and 3 feet wide. It is made in two pieces, joining near the junction, and is of sound mahogany, French polished.

As will be seen by the plan, the lay-out consists of a double-line junction, with crossover and refuge sidings. The facing point at the junction is protected by a facing point lock and lock bar. Detectors are fitted, and there

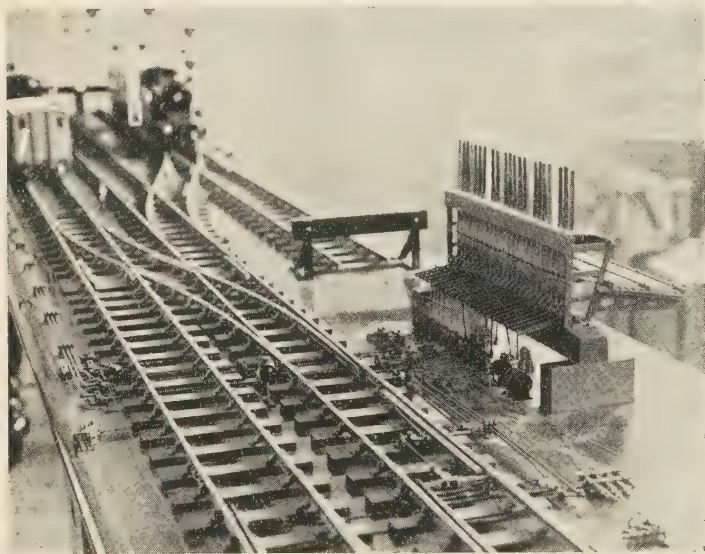


FIG. 1.—PHOTOGRAPH OF CENTRAL PORTION OF SIGNALLING MODEL, SHOWING THE LEVERS AND LOCKING FRAME.

is also a lock bar lock at the points leading from the siding to main line. All the points and signals are worked from the signal cabin, or rather locking frame. This is a new size, and is made exactly to a scale of  $\frac{3}{4}$ " to 1 foot, which should be a very useful size to adopt for outdoor model railways. All the signal wires, point rods, lock bars, detectors, etc., etc., are to scale, and in consequence look very neat and compact. Two trains are provided—passenger and goods. The two locomotives are similar and are practically true models of the L. & N.W. tanks with the trailing wheels left out and the bunker shortened. The passenger train consists of one vehicle only—a composite brake, and the goods train of one brake and one wagon. The whole is fitted with a polished brass framework all round the table, upon which a canvas cover rests, and is so arranged that it can be fixed on by a padlock. When the model is in use the cover is removed and the brass frame folds down out of the way.



FIG. 2.—PHOTOGRAPH OF SIGNALING INSTRUCTION MODEL, MADE FOR THE  
LONDON & NORTH-WESTERN RAILWAY COMPANY.

(The locomotives employed in this model are built from standard "Precursor Tank" parts, but have the trailing wheels omitted.)

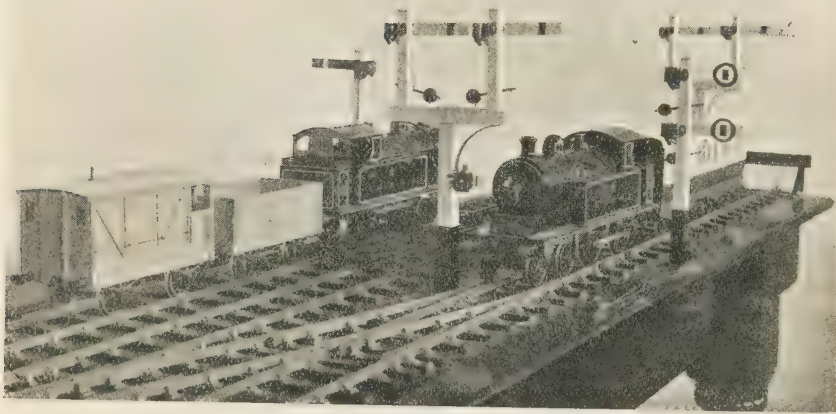


FIG. 3.—RIGHT-HAND-END OF SET-PIECE.

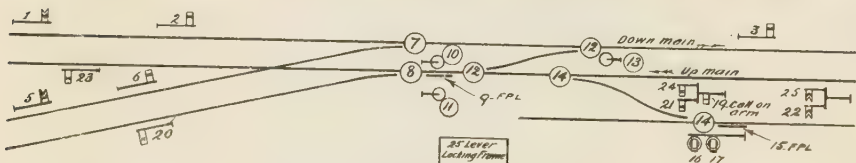


FIG. 4.—BLOCK PLAN OF MODEL.

## LOCKING TABLE.

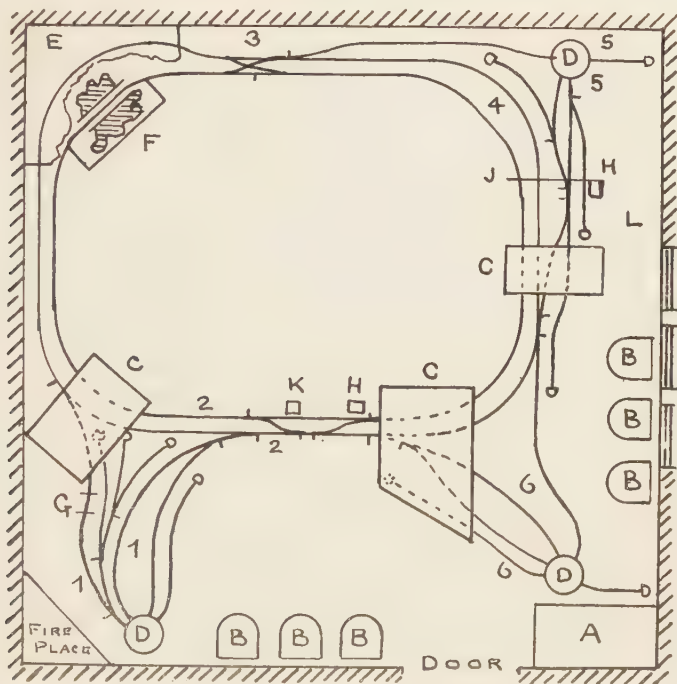
| No. | DESCRIPTION OF LEVERS.           | RELEASES              | BACK<br>LOCKS | LOCKS.                       |
|-----|----------------------------------|-----------------------|---------------|------------------------------|
| 1   | Down distant signal .. ..        | .. ..                 | 2, 3          |                              |
| 2   | " home .. ..                     | I ..                  | ..            | 7, 12                        |
| 3   | " starting .. ..                 | I, 5 ..               | ..            | 13, (7), (12)                |
| 4   | Spare lever .. ..                | .. ..                 | ..            |                              |
| 5   | Down branch distant signal ..    | .. ..                 | 3, 6          |                              |
| 6   | " " home .. ..                   | 5 ..                  | 7             | 12                           |
| 7   | Points to down branch .. ..      | 6 ..                  | 8             | 2                            |
| 8   | " up .. ..                       | 7, 16, 21 ..          | ..            | 17, 24                       |
| 9   | Facing point lock .. ..          | 13, 16, 17, 21, 24 .. | ..            |                              |
| 10  | Disc up to down line .. ..       | .. ..                 | 12            | 13, 20, 23, (8), (9)         |
| 11  | Disc to loop .. ..               | .. ..                 | 14            | 15, 20, 23, (8), (9)         |
| 12  | Crossover points .. ..           | 10, 13 ..             | ..            | 2, 6, 14, 21, 24             |
| 13  | Disc down to up main line ..     | .. ..                 | 9, 12         | 3, 10                        |
| 14  | Points up main to loop .. ..     | 11, 15 ..             | ..            | 12, 21, 24                   |
| 15  | Facing point lock .. ..          | 16, 17 ..             | 14            | 11                           |
| 16  | Loop to branch home signal ..    | .. ..                 | 8, 9, 15      |                              |
| 17  | " main .. ..                     | .. ..                 | 9, 15         | 8                            |
| 18  | Spare lever .. ..                | .. ..                 | ..            |                              |
| 19  | Call on arm .. ..                | .. ..                 | 9             | 14, 12, 21, 24               |
| 20  | Up branch starting signal ..     | 22 ..                 | ..            | 10, 11, (8), (9), (12), (14) |
| 21  | Up main to branch home signal .. | 22 ..                 | 8, 9          | 12, 14                       |
| 22  | " " distant .. ..                | .. ..                 | 20, 21        |                              |
| 23  | " starting signal .. ..          | 25 ..                 | ..            | 10, 11, (8), (9), (12), (14) |
| 24  | " home signal .. ..              | 25 ..                 | 9             | 8, 12, 14                    |
| 25  | " distant signal .. ..           | .. ..                 | 23, 24        |                              |

( ) Signifies locks in both positions.



## ST. PETER'S MODEL RAILWAY.

THE railway which is illustrated in this article was designed and built to form an object of instruction and amusement for the boys in Mr. Hodgson's preparatory school at Exmouth. It occupies the floor space of a large room, in the school sanatorium, and is so constructed that it is readily removable.



PLAN OF ST. PETER'S MODEL RAILWAY, EXMOUTH (NO. 1 GAUGE.)  
(Curves and points all large radii.)

- |                          |                    |                         |
|--------------------------|--------------------|-------------------------|
| A—Cupboard for battery.  | E—Tunnels.         | J—Gantry.               |
| B—Chairs for spectators. | F—Bridge and pond. | K—Water tank.           |
| C—Bridges for operators. | G—Level-crossing.  | L—Site of cement works. |
| D—Turntables.            | H—Signalboxes.     |                         |
- STATIONS AT
- |                     |            |             |
|---------------------|------------|-------------|
| 1—London Bridge.    | 3—Redhill. | 5—Brighton. |
| 2—Clapham Junction. | 4—Hove.    | 6—Victoria. |

Platforms and signals are not shown.

Size of room, 18 feet by 18 feet.

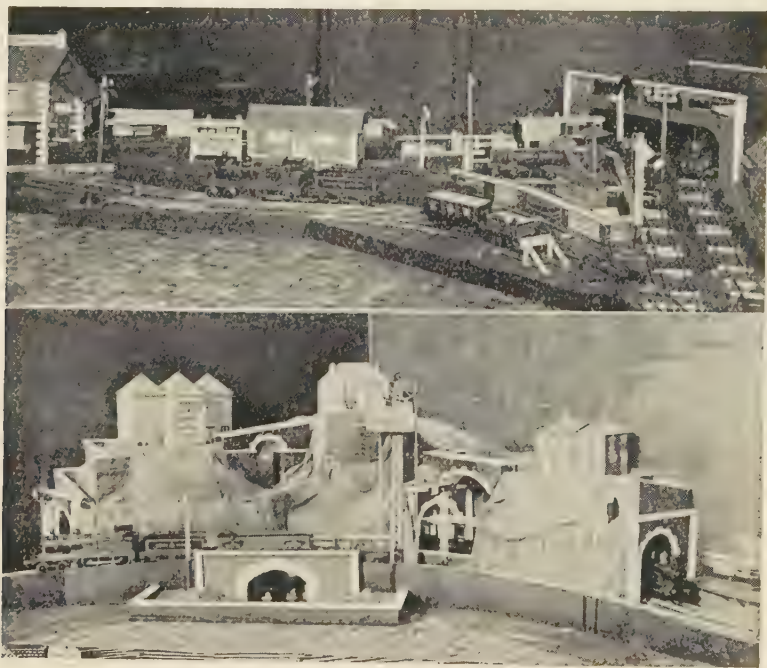
In designing and planning the line, the chief object in view was the convenience of the operators and an uninterrupted view for the spectators. After a good many preliminary trials the arrangement shown on the plan was finally adopted and fully answers both requirements. To guard against accidental

damage, spectators and operators alike are only permitted to cross the line by the three bridges marked C in the plan.

The rails are of No. 1 gauge, and all curves and points are of the large radius, with the exception of a double cross-over near Redhill station.

There are four principal stations, three being termini in three corners of the room, while Clapham Junction is an important centre and the operator has to be very wide awake to manage his eight switches correctly. The three turntables marked D in the plan are very convenient for marshalling trains, reversing engines, etc.

The permanent way consists of about thirty separate pieces, which interlock. The foundations are cross-pieces of 1"×1" deal, to the upper



TWO VIEWS ON THE ST. PETER'S MODEL RAILWAY :  
(1) LONDON BRIDGE STATION ; (2) THE TUNNELS.

surface of which are nailed  $\frac{1}{2}$ " boards painted a dull drab colour. No stone chippings have been used in imitation of ballast on account of the increased weight caused thereby, as the whole plant must occasionally be removed and stored. The tin rails are screwed through holes in the sleepers on to the boards. To get the rails into the desired position, it was necessary to interpose straight pieces and curves of longer or shorter lengths. A circular saw driven at a great speed was found to be by far the best method of cutting the rails, but the whole business of rail laying was slow and tedious. To get the joints opposite each other in the double main line which runs round the room was a particularly troublesome piece of work. Then again, allowance was not made at first for the space required for the platforms, and this necessitated a great deal of arrangement.

All the signals on the main line are connected by a simple system of levers to the switches. This is almost essential to prevent accidents, for the operator in charge at Clapham Junction (marked 2 on the plan) can see at a glance if the main lines are clear or blocked. Electric bell wires are concealed under the permanent way, and the three termini can communicate with Clapham Junction and vice versa, with a different toned bell concealed in the signalboxes or stations. Telegraph poles occur at intervals, and when the line was first worked there were three copper wires connected to them through which ran the current to operate the bells, but they proved to be so much in the way when manipulating the trains that they have since been removed.

The stations are of cardboard and wood, with doors, windows, and the usual fittings. The platforms are of wood, covered with glue and sand, and painted. A dozen garden seats on the various platforms give a realistic



GENERAL VIEW OF ST. PETER'S MODEL RAILWAY, SHOWING SOME OF THE OVERBRIDGES AND THE MODEL CEMENT WORKS.

appearance. The bridges C are substantial affairs, and will easily support a weight of 16-stone. They are of wood, covered with red paper ruled in imitation of brickwork, finished off with white in imitation of stonework, and are well covered with the model advertisements supplied by Messrs. Bassett-Lowke, Ltd.

A double tunnel occupies the corner of the room marked E, and is made more "life-like" by walled paths, model houses and miniature bridges. At the foot of the tunnel is a pond, across which, supported by a bridge, runs the inner main line. There is a gradient on each side of the bridge of 1 in 50. The triangular space near by is a walled-in goods yard, approached by a level-crossing with spring gates. The yard contains a crane for lifting logs of wood on to trucks.



The cement works are removable, but usually occupy the space marked L in front of the gantry. The "works" comprise an elevated inclined track of No. 0 gauge about 4 feet long. The lines descend from the (dummy) engine house, inside of which is an axle revolved by hand. To the axle are fastened two lengths of string which pass around various pulleys, and are attached to tin tipping trucks. One truck ascends while the other runs down. The contents of the trucks (limestone chippings) are then shot down a funnel on to an open truck standing on the main line of the railway proper. This operation greatly interests visitors.

The rolling stock embraces half-a-dozen powerful clockwork locomotives, the pride of the line being one of Messrs. Bassett-Lowke's Great Central scale model engines. All engines have reversing motion, and have been fitted with heavy six-wheeled tenders; the usual four-wheeled tenders are too light and short in the wheel-base, and have a partiality for jumping the rails at the points, particularly when running backwards. There are about a dozen passenger coaches of different types, bogie and otherwise, guards' vans, and a varied assortment of wagons, trucks, etc.

The plan of the line admits of a large number of operations affording plenty of variety in the routes selected for travelling.

The construction of the railway, all of which is the work of an amateur, with the exception of the rails, rolling stock and signal-posts, occupied more than two years.

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### BRUSSELS MINIATURE RAILWAY.

On Saturday, April 23rd, this line was opened for traffic, and as it was the only attraction, among the many with which the visitor to the Exhibition

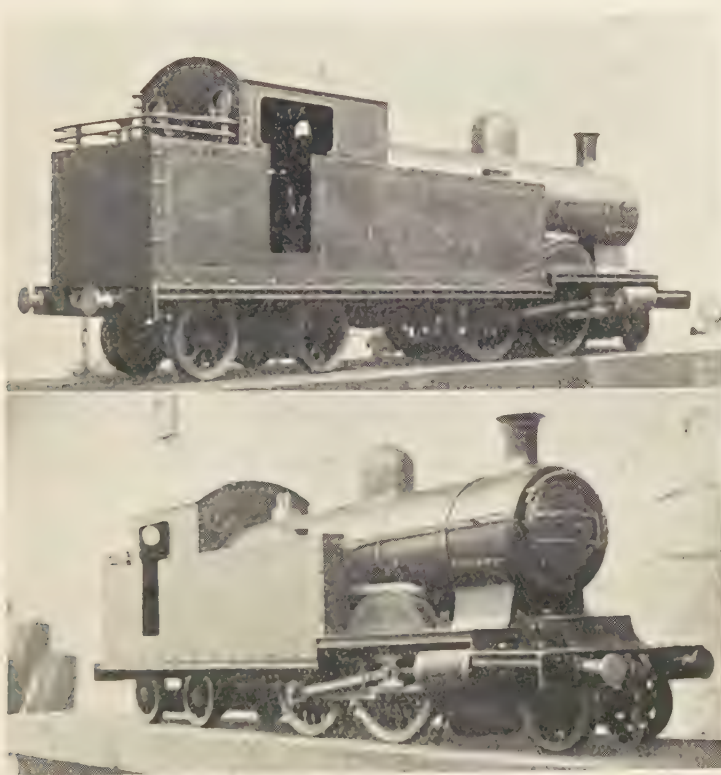


will be provided, ready for work, it proved very popular. The accompanying photograph shows the entrance to the tunnels referred to in our last issue.



**AN INTERESTING MODEL LOCOMOTIVE.**

THE locomotive is a machine which lends itself to immense variety in the matter of design, and we are always glad to publish particulars of models which exemplify originality in this respect. The model illustrated in the accompanying pictures is very interesting in that it is an adaptation of a type common in Germany to English ideas of external design. The wheel arrangement is identical with the 2-4-4 type tank engines built by Krauss & Co., Munich, for the Bavarian State Railways.



MODEL 4½" GAUGE 2-4-4 TYPE TANK LOCOMOTIVE.

The *raison d'être* of the design is "unlimited firebox," and it is to be regretted that the unreasonably large dimensions of the cylinders, the absence of a super-heater and other defects which do not bear on the main design, prevent the model being such a success as it might if it had been made in the light of modern experience. We well remember the designers (it was the outcome of several members of a leading model engineers' club) flouting our then new ideas in the matter of superheating, and vehemently protesting that the shortest possible steam-pipe was the best in real and model practice. He who lives longest sees the most! What with the yards of ½" pipe now used in successful working model locomotives between boiler and cylinders, and all the leading railway companies employing Schmidt superheaters, the year 1910 puts the matter on different standing.

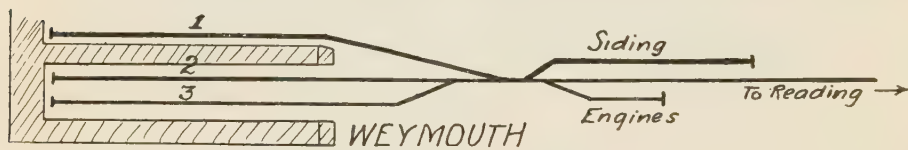
We have to thank the present owner, Mr. McNiell, for permission to photograph his model. We shall be glad of our readers' criticisms of the design. The model is now fired with solid fuel, and is painted S.E. & C.R. colours.

## CAPTAIN COLSTON'S No. 0 GAUGE MODEL "Q.P. RAILWAY."

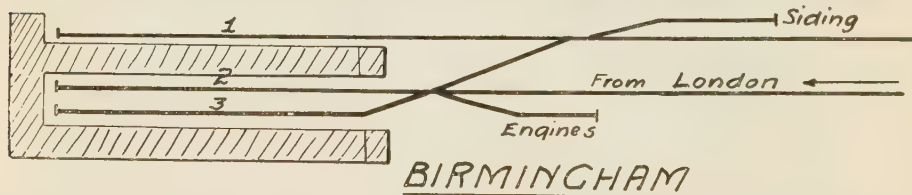
### FURTHER NOTES OF INTEREST.

(Continued from page 162).

SINCE going to press with the last issue, the owner of the above-named model railway has provided us with some additional particulars, which will enable those readers who wish to emulate the scheme to more readily get a better idea of the methods of operating the line. The tables herewith include "Reading," "Weymouth," and "Bristol" running orders, copies of which



must be placed in the hands of the "stationmasters" at each station. The arrangements are most carefully thought out, and strict adherence is necessary to the written orders, otherwise time is sure to be lost. It is interesting to note in watching the working of the time-table how essential it was to previously work out practically the various shunting operations, and to determine



by experiment the best platform into which a given train should run, to enable the "through" coaches to be attached and detached in the most convenient manner and without a lot of needless shunting.

All the track is double, except the branch to Weymouth. Over fifty switches are employed in the lay-out, and the total length of the track from "Paddington" to "Bristol" is 96 feet (about 10" to the mile) and the time allowed for a "non-stop" train, as is shown in the time-tables reproduced in our last number, is two minutes, a stopping train taking about eight minutes, and an ordinary goods fourteen minutes. All the times are actual times. Of course they may be arranged to start from any level hour.

### Model Q. P. Railway. READING STATION RUNNING ORDERS.

| <i>Time.</i> | <i>Train.</i> |                                                                                                                                               |
|--------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 9-1          | Branch.       | Arr. on No. 3 platform, engine runs round train, on arrival of up Local on No. 4 platform, pulls out on to branch curve, leaving front coach. |
| 9-2          | 1             | Arr. No. 1 platform, detaches rear coach.                                                                                                     |
| 9-4          | 2             | Arr. No. 4 platform, engine picks up Weymouth coach off No. 3 platform and backs on to train.                                                 |
| 9-6          | 3             | Runs through on No. 2 platform.                                                                                                               |
| 9-6          | 4             | Runs through on No. 3 platform.                                                                                                               |
|              | 1             | Dep. immediately No. 3 is clear.                                                                                                              |
| 9-8          | 2             | Dep. from No. 4 platform.                                                                                                                     |
|              |               | Branch train backs on to No. 1 platform.                                                                                                      |
| 9-9          | Branch.       | Picks up through coach and departs to Weymouth.                                                                                               |
| 9-11         | 5             | Weymouth express runs through.                                                                                                                |
| 9-13         | 6             | Bristol stopping train arrives No. 4 platform, engine runs round train and shunts into No. 4 siding.                                          |
| 9-15         | 7             | Up Weymouth express arrives No. 3 platform.                                                                                                   |
| 9-16         | 7             | Ditto dep.                                                                                                                                    |
| 9-21         | 8             | Newspaper Special arrives No. 2 platform.                                                                                                     |
| 9-22         | 8             | Ditto dep.                                                                                                                                    |
| 9-26         | Branch.       | Arr. on No. 3 platform ; same procedure as at 9-1.                                                                                            |
| 9-28         | 10            | Arr. No. 1 platform, detaches rear coach.                                                                                                     |
| 9-28         | 9             | Arr. No. 4 platform, picks up a coach.                                                                                                        |
| 9-29         | 12            | Down Riviera runs through, slipping a coach at 9-29.                                                                                          |
| 9-32         | 10            | Dep. No. 1 platform.                                                                                                                          |
| 9-32         | 9             | Dep. No. 4 platform.                                                                                                                          |
| 9-34         | Branch.       | Picks up slip coach on No. 2 platform and coach on No. 1 ; dep. for Weymouth.                                                                 |
| 9-36         | 13            | Dep. No. 4.                                                                                                                                   |
| 9-42         | G 14          | Arr., shunts on to No. 1 and No. 2 sidings.                                                                                                   |
| 9-42         | G 15          | Arr. No. 4 platform, shunts on to No. 4 siding.                                                                                               |
| 9-47         | 16            | Arr. No. 3.                                                                                                                                   |
| 9-48         | ..            | Ditto departs.                                                                                                                                |
| 9-52         | G 14          | Dep. from No. 1.                                                                                                                              |
| 9-52         | G 15          | Dep. from No. 4.                                                                                                                              |
| 9-56         | 17            | Down S. Wales Express runs through.                                                                                                           |
| 10-0         | 18            | Up Riviera Express runs through.                                                                                                              |
| 10-7         | 19            | Down Weymouth Express runs through.                                                                                                           |
| 10-9         | 20            | Up Channel Islands Express runs through.                                                                                                      |
| 10-12        | Branch.       | Arr. on No. 3 platform, engine runs round train and shunts on No. 1 platform.                                                                 |
| 10-14        | 21            | Arr. No. 4 platform, picks up coach off No. 3 platform.                                                                                       |
| 10-14        | G 22          | Down fast goods arr. No. 2 platform.                                                                                                          |
| 10-15        | G 22          | Ditto departs.                                                                                                                                |
| 10-15        | 23            | Up S. Wales Express runs through.                                                                                                             |
| 10-17        | Branch.       | Dep. from No. 1 platform.                                                                                                                     |
| 10-18        | 21            | Dep. No. 4 platform.                                                                                                                          |
| 10-21        | 25            | Ocean Mails Special runs through.                                                                                                             |
| 10-23        | 24            | Arr. No. 1 platform.                                                                                                                          |
| 10-24        | 26            | Bristol and Exeter Express runs through.                                                                                                      |
| 10-24        | 24            | Dep. No. 1 platform.                                                                                                                          |

## Model Q. P. Railway.

**BRISTOL RUNNING ORDERS.**

| <i>Time.</i> | <i>Train.</i> |                                                            |
|--------------|---------------|------------------------------------------------------------|
| 9-2          | 2             | <i>Dep. from No. 1 platform.</i>                           |
| 9-5          | 4             | <i>Dep. from No. 2 platform.</i>                           |
| 9-7          | 3             | <i>Arr. at No. 3 platform.</i>                             |
| 9-8          | 1             | <i>Arr. at No. 4. platform.</i>                            |
| (9-10)       | ..            | <i>Train backs on to No. 1 platform from No. 1 siding.</i> |
| 9-11         | 6             | <i>Dep. from No. 1 platform.</i>                           |
| (9-12)       | ..            | <i>Shunt No. 3 on to No. 2 platform.</i>                   |
| (9-14)       | ..            | <i>Shunt No. 1 on to No. 1 platform.</i>                   |
| 9-23         | 8             | <i>Arr. at No. 4 platform.</i>                             |
| 9-26         | 9             | <i>Dep. from No. 1. platform</i>                           |
| 9-28         | 11            | <i>Dep. from No. 2 platform.</i>                           |
| 9-30         | 12            | <i>Arr. at No. 3 platform.</i>                             |
| (9-31)       | ..            | <i>Shunt No. 8 on to No. 1 siding.</i>                     |
| (9-32)       | ..            | <i>Shunt No. 12 on to No. 2 platform.</i>                  |
| 9-34         | 10            | <i>Arr. at No. 4 platform.</i>                             |
| 9-38         | 13            | <i>Arr. at No. 3 platform.</i>                             |
| 9-40         | G 15          | <i>Dep.</i>                                                |
| 9-46         | 16            | <i>Dep. from No. 3 platform.</i>                           |
| 9-54         | G 14          | <i>Arr. Shunts to No. 2 siding.</i>                        |
| 9-57         | 17            | <i>Arr. at No. 3 platform.</i>                             |
| 9-59         | 18            | <i>Dep. from No. 2 platform.</i>                           |
| (10-0)       | ..            | <i>Shunt No. 10 on to No. 1 platform.</i>                  |
| (10-1)       | ..            | <i>Shunt No. 17 to No. 2 platform.</i>                     |
| (10-3)       | ..            | <i>Shunt No. 8 from No. 1 siding to No. 3 platform.</i>    |
| 10-12        | .21           | <i>Dep. from No. 1 platform.</i>                           |
| 10-14        | 23            | <i>Dep. from No. 2 platform.</i>                           |
| 10-16        | G 22          | <i>Arr. at No. 4 platform shunts to No. 1 siding.</i>      |
| 10-20        | 25            | <i>Dep. from No. 3 platform.</i>                           |
| 10-25        | 26            | <i>Arr. at No. 3 platform.</i>                             |
| 10-26        | 24            | <i>Arr. at No. 4 platform.</i>                             |

**WEYMOUTH RUNNING ORDERS.**

| <i>Time.</i> | <i>Train.</i>  |                                                                             |
|--------------|----------------|-----------------------------------------------------------------------------|
| 9-0          | <i>Branch.</i> | <i>Dep. No. 1 platform.</i>                                                 |
| 9-10         | <i>Branch.</i> | <i>Arr. No. 1 platform.</i>                                                 |
| 9-12         | <i>No. 5</i>   | <i>Arr. No. 3 platform.</i>                                                 |
| 9-14         | <i>No. 7</i>   | <i>Dep. No. 2 platform.</i>                                                 |
| (9-16)       | ..             | <i>Branch train engine shunts out and hooks on again in front of train.</i> |
| (9-20)       | ..             | <i>No. 5 shunts out and backs on to No. 2 platform.</i>                     |
| 9-26         | <i>Branch.</i> | <i>Dep. No. 1 platform.</i>                                                 |
| 9-36         | <i>Branch.</i> | <i>Arr. No. 1 platform.</i>                                                 |
| (9-38)       | ..             | <i>Branch train engine shunts out and hooks on again in front of train.</i> |
| 10-7         | <i>No. 19</i>  | <i>Arr. No. 3 platform.</i>                                                 |
| 10-9         | <i>No. 20</i>  | <i>Dep. No. 2 platform.</i>                                                 |
| 10-11        | <i>Branch.</i> | <i>Dep. No. 1 platform.</i>                                                 |
| 10-18        | <i>Branch.</i> | <i>Arr. No. 1 platform.</i>                                                 |
| 10-20        | ..             | <i>Shunts.</i>                                                              |



## NEW SERIES OF MINIATURE ADVERTISEMENTS.

For some time past Messrs. Bassett-Lowke, Ltd. have distributed miniature advertisements, which were for the most part placed at their disposal by the firms whose wares were advertised. The getting together of the sets has, however, not been entirely satisfactory, and as the sizes have not been suitable for the smaller gauge model railways which are now so popular, the



PHOTOGRAPH OF COMPLETE SHEET OF MINIATURE ENAMELLED  
ADVERTISEMENTS BEFORE BEING CUT UP.

(This picture was specially taken by the *Imperial Plate Co.*, Cricklewood, on a Non-filter orthochromatic plate. It gives a much more correct rendering than was obtained on an ordinary special plate).

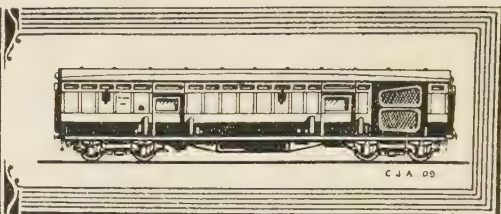
firm have taken the production of a really representative set of advertisements in hand themselves. A printed tin sheet before cutting up is shown in accompanying illustration.

The sets are divided into six, price 1/- per packet, and include, beside the advertisement plates, useful road, locomotive and carriage signs :

- No. 1. 24 selected advertisements and 6 signalbox signs.
- No. 2. 26 smaller scale selected advertisements.
- No. 3. 20 selected advertisements and 4 coach labels.
- No. 4. 12 selected advertisements and 15 level indicators.
- No. 5. 14 selected advertisements and 18 engine destination boards.
- No. 6. 14 selected advertisements and 27 station signs.

The advertisement plates are punched with four holes, and the signs with holes as necessary. The level indicators are arranged with holes so they may be spiked to a post at the proper angle.

# Letters to The Editors



## BUILDING A MODEL M.R. LOCOMOTIVE.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I herewith enclose a photograph of my model, together with a brief description of same, which I should be pleased if you would publish in your valuable paper, *Model Railways and Locomotives*, of which I am a constant reader. It is a model Midland  $\frac{5}{8}$ " scale,  $3\frac{1}{4}$ " gauge, same as designed by H. Greenly, with the exceptions (1) that the boiler is not of the Belpaire type, and (2) it has not a slip eccentric gear, but a Stephenson link motion. The boiler is of the standard water-tube type, and has seven water tubes  $\frac{1}{4}$ ", with super-heater and downcomer. It is fired with a Primus No. 4 burner, squeezed



at each side to fit firebox. I tried a methylated spirit burner, but found it would not keep a constant working pressure of 60lbs. The firebox has a double casing to protect paint. The tender is on a double bogie, and contains two tanks (one for paraffin oil, the other for water) and a hand pump. The footplates of both engine and tender are of German silver. I have used this in nearly all parts where steel is generally used, as it does not rust. The superstructures are built up from sheets of Russian iron. The cab fittings are water-gauge, pressure-gauge, blower and blow-off cock. The fittings and parts were supplied by a well-known firm. It is painted the proper Midland colour, and is lined with strips of copper.

The model under test has given me every satisfaction, and occupied one year of my spare time in making same. It gained first prize at the Edinburgh Industrial Exhibition of last year, and *Model Engineer* silver medal. I am a medical student, and have found this a very interesting and pleasant hobby.

EDINBURGH.

Yours faithfully,

L. G. GILAN.

A USEFUL COMMUNICATION FROM A CANADIAN READER.  
TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

As requested in your recent letter, I am enclosing herewith three small snapshots of my model railway, with the following short description:—Living in the city, and being limited to space, I was compelled to make my railway in just one circle 22 feet in diameter. My locomotive is a 4-6-0 type passenger engine of strictly American design. I designed the engine myself, and had most of the machining work done by Mr. W. Pender, of Montreal. The principal dimensions are as follows:—

|                                                   |                                     |
|---------------------------------------------------|-------------------------------------|
| Diameter of cylinders, 1".                        | Length of boiler, 18".              |
| Stroke of cylinders, $1\frac{3}{8}$ ".            | Gauge of track, $3\frac{1}{4}$ ".   |
| Diameter of driving wheel, $4\frac{1}{4}$ ".      | Heating surface, 180 sq. inches.    |
| Diameter of truck wheels, $1\frac{3}{4}$ ".       | Boiler pressure, 50lbs. per sq. in. |
| Diameter of boiler, $3\frac{3}{8}$ " (front end). | Fuel, methyated spirits.            |

The boiler is made of copper plates  $\frac{1}{8}$ " thick, riveted together, and with six flues  $\frac{3}{4}$ " diameter, side and main rods being cut out of solid steel, with brass bushings. I might also state that all of the wearing parts on the engine



PHOTOGRAPH OF MR. H. R. GERRIE'S CANADIAN PACIFIC LOCOMOTIVE.

are fitted with brass bushings. Weight of engine and tender in working order 70lbs. The tender, which is made of sheet copper, is divided into two parts, the right side for methyated spirits, and the left for water. Spirits running into the lamp by gravity and regulated by small valve. Speed of engine on circular track 10' radius, 5 miles per hour.

I also have a postcard from you asking for full particulars and cost of rails of American section, and wishing me to state that the price I paid for having my rails made. They came from Ansonia, Conn., U.S.A., and cost \$21.50 per 100lbs. Of course, it cost me extra (\$20.00) to have tools made for manufacturing same; this of course must be added to the total cost. I am sending you a sample of the rail under separate cover, and you will then be in a better position to know what it would cost you to have made there. I must say for model railways, and even for switches, this rail is very convenient, being not only very solid, but less trouble on account of not having any chairs.



I also wish to state that I am sending you, under separate cover, photographs of some of the latest American types of locomotives, which I have cut out of catalogues of the American Locomotive Co., New York, which I thought would be of interest to you.

Yours very truly,  
H. R. GERRIE.

[We have shown Messrs. Bassett-Lowke Mr. Gerrie's letter, and they will undertake to obtain the rail for any reader who specially requires it at a trifle over cost price to allow for packing, etc. We await the sample our correspondent is sending us, and will publish a full size section of it as soon as it arrives.—EDITORS, *Model Railways and Locomotives*.]

### THE S.E. & C.R. "CAR" TRAIN.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRs,

In answer to your query in "Answers to Correspondents" with regard to the S.E.R. "car train," I venture to reply. The train is one, made up of a special set of cars (American type) painted in standard colours, but very highly decorated. The number of cars varies with the number of passengers; usually the train consists of six or seven vehicles. The interior of the cars is fitted up with seats to hold two people each. These are ranged down each side of a central corridor. The train runs between London (Charing Cross) and Dover. Hoping this will be of interest to B. de N. (Tooting) as well as other readers,

Yours truly,  
H. H. WINGFIELD.

### ANSWERS TO CORRESPONDENTS.

T. H. (Denton)—A model 4-6-0 N.E.R. tank locomotive could be made to traverse the standard curves if you reduce not only the coupled, but the total wheelbase to the minimum. The six-coupled Engine is a good prototype for a clockwork or electric model. There are some new clockwork motors which are out for the first time this year. Write to the makers for prices and sizes.

R. ROPNER.—Thanks for letters and photographs.

E. M. DERRY (Surbiton).—We thank you for your fulsome praise of "Tinol." We would have inserted, only you did not give any practical examples which have come within your experience of its uses.

L. H. A. C. (Blackpool)—Your article will have to be left over until after the special G.N.R. number to be published in July.

S. J. H. (Birmingham)—Writes to say that he is laying down a 250' long garden railway and would be glad of some tips from other readers. The article published in the "Captain" last July should help him.



DAVID RANDALL (Liverpool)—Wants a suggestion for an apparatus for preventing two model trains from entering a single line section in reverse directions at the same time without the usual signalling arrangements or staff system. Clockwork locomotives would be used. He would like the apparatus to be automatic in action,—Now here's a chance for the ingenious reader!

L. S. W. R. (Liverpool)—No, the model mentioned is unsuitable for a 15" radius curve. Tell your newsagent to apply to the Aldine Publishing Co.

F. F. H. (Garden City)—We trust you will be able to get good photographs of your loco. taken by a professional. Insist on the smallest stop and prolonged exposure. Make him keep the camera down to footplate level. Show him some of the better photographs we have published.

R. C. O. P. (Brentwood)—Ask a local builder if he can supply you with granite chips. We are requesting Messrs. Bassett-Lowke to take up the sale of suitable materials for model railway ballasting.

F. H. (Farnham)—Plans for reproduction in our Magazine should be double the size. For a block going across the page the drawing should be 9½", for a full page 9" × 13" is the best size. Half-plate photographs are best, but 5" × 4" or post card size do very well.

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### READERS IN DIFFICULTIES.

#### DIFFICULTY No. 90.—BALLASTING OUT-DOOR LINE.

R. W. J. G. (Hayward's Heath).—Use granite chips, but to prevent weeds growing up between the rails the foundation of the line should be gravel, with a covering of fine concrete (say, a mixture of cement and coarse washed sand). The embankments should be of gravel concrete "rendered" over with finer cement, as above. This will be found necessary if the embankments are narrow. For wider embankments, throw up the earth in the usual way, and concrete the top. The wooden frames on which the sleepers are laid should be let in flush with the cement surface.

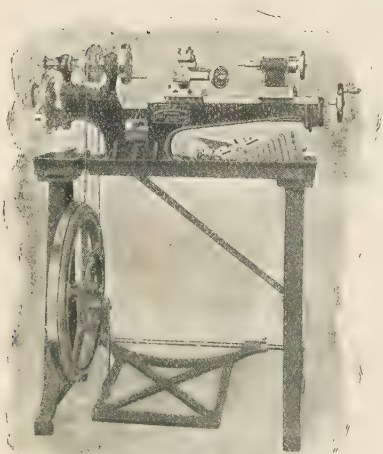
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THE record for heaviest freight trains has again been beaten by the Pennsylvania Railway. A train of 7,644 tons was hauled by the locomotive No. 1113. The train consisted of 105 steel cars loaded with 5,544 tons of coal, and the run from Altoona to Harrisburg, 127 miles, was made in 7 hours 12 minutes, or an average speed of 17.6 miles per hour. That part of the line over which the test was made, from Altoona to Enola, presents at no point a greater gradient than 1 in 440. Locomotive No. 1113, which drew this train, has a tractive power of 42,661 lb. Traffic conditions in this country do not call for work of this class.—*Engineer*.

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OWING to the increasing popularity of the automatic ticket delivery machines which have been placed in the Tube and District stations, the management of the Bakerloo, Piccadilly, and Hampstead lines have ordered twenty-five more, making fifty in all. Recently 76,000 tickets were issued by the machines in one week.

### A LATHE FOR THE ANTARCTIC.



MESSRS DRUMMOND BROS., LTD., of Guildford, already claim that their lathes have a more wide world distribution than any other makers, and they will soon be able to claim that one of their tools will be the first in the Antarctic regions, as they have just supplied Captain Scott's South Polar Expedition with one of their well-known screw-cutting motor repairing lathes, fitted, at the request of the expedition, with the same accessories as one recently supplied to H.M.S. "Swift."

We believe that this is the very first time that a polar expedition has taken a lathe as part of their equipment. As the Scott expedition have taken motors with them, the tool will probably be of great use, and ought also to relieve

the tedium of the long waits at the base as no other occupation could. Most, if not all, of the members of such an expedition are good practical mechanics to a more or less extent, and in such hands a lathe should prove one of the most welcome parts of the equipment, the absorbing and never-failing interest in lathe work to ingenious experimenters and amateur mechanics is extraordinary, and in relieving the monotony of existence at a polar expedition base, a lathe should be worth its weight in gold. But what about keeping the slide rest handles at a comfortable temperature?

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### "TINOL" AND ITS USES.

The proprietors of "Tinol," the combined soldering metal and flux, as mentioned in our last issue, placed a sample set with vapour lamp at our disposal, and we took the same to Brussels in the hope that it would come in handy for odd soldering jobs in connection with the wiring of the several railway companies' model railways we are interested in there. It was just the thing, as the usual blow-lamp was barred by fire restrictions. For making joints in electric wiring it is one of the most cleanly preparations we have used. You just strip the insulating covering off, twist up the ends to be joined, put a touch of the "Tinol" paste and pass the same into the flame of the lamp for a moment, and a perfect electrical and mechanical joint is formed.

Used with the iron, the ease with which "Tinol" can be applied is marvellous. It is not messy: the solder and the flux being mixed in the right proportions, there is no superfluous flux left after the joint is made. Another thing in its favour is that the tinning of the iron (*i.e.*, coating the iron with solder) which is necessary to many good joints, is so easy with "Tinol." Make the iron hot—not red of course—clean, the point with a file and rub it on a blob of "Tinol" on a piece of tin-plate or other suitable metal, and the point is beautifully coated and ready for instant use. The chief advantages of "Tinol" are that it makes a neat joint quickly and without mess, and furthermore is extremely economical for all small jobs.

# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 7.

JULY, 1910.

## OUR SPECIAL GREAT NORTHERN RAILWAY NUMBER.

A WORD or two of explanation is perhaps due to the reader in submitting this our special "G.N.R." number. In the first place our aim has been to give the maker of a model railway—especially those who favour the Great Northern system—in one issue of the magazine, some idea of the salient features of this justly popular line—its geography, its engineering peculiarities, its signals, its express train services, its carriages and wagons, and lastly, but not least, something about its locomotives and the place where they are for the most part built. We think that the issue does this, and we shall be well rewarded if our readers find it useful in correctly modelling the various details of G.N.R. practice.

It is not, of course, intended to alter the scope of our Magazine by dealing largely with real railway work to the exclusion of information on purely model subjects, but we think that although this issue comprises useful descriptions, drawings, and photographs of models of G.N.R. locomotives and rolling stock—not to mention the double-page supplement plate—the preponderance in this direction will be welcomed by the large majority of our readers as a pleasant and welcome change. It is necessary to know something of real railway practice to be able to model it accurately, and this is more particularly the object of our special number.

We have to thank the officials of the Great Northern Railway Company, the engineering departments especially, for their kind co-operation in its production.

## ANSWERS TO CORRESPONDENTS.

A.W.L. (California).—Thanks for pictures.

F.H. and others. —The matter is being dealt with, and is appearing in next issue.

R.A.B.—Many thanks for article.

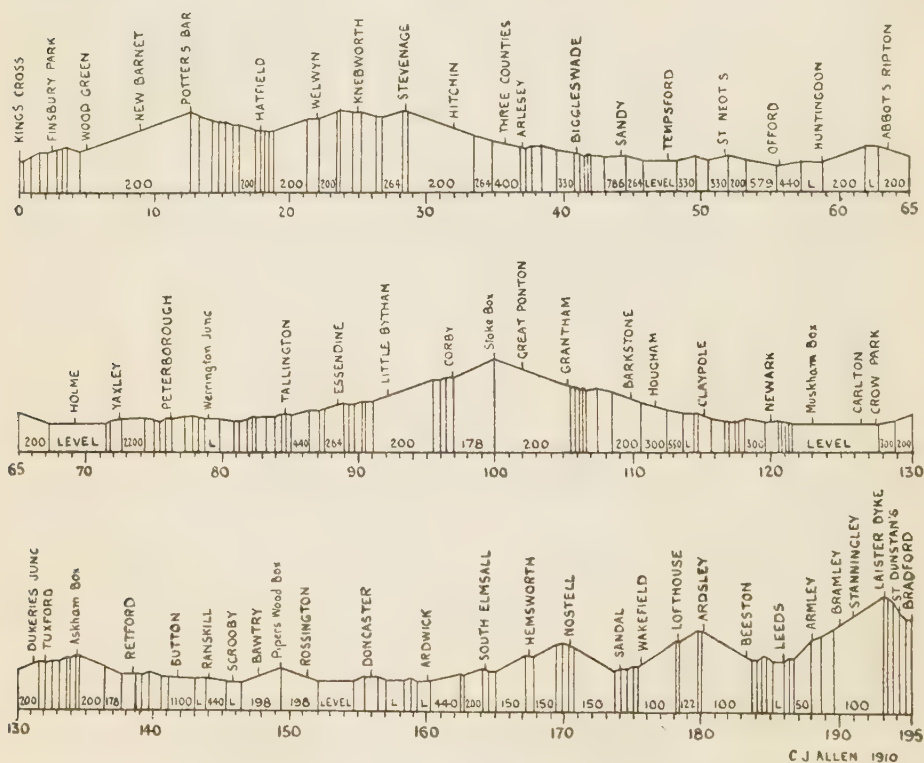
G.L.B.—Thanks, but they were too late.

J.B. (London).—The G.N.R. have their large electric model railway at Brussels Exhibition. The model G.N. railway at the Japanese Exhibition, London, is No. 0 gauge, and will be described in a later issue. Photographs are not to hand yet. The new G.N.R. medal is ready.

## THE ENGINEERING FEATURES OF THE GREAT NORTHERN RAILWAY.

BY CECIL J. ALLEN.

THE Great Northern Railway system was from the first not only engineered with great skill, considering the hilly nature of the country to be traversed, but was also laid out in a thoroughly solid and enduring manner, the directors wisely realising that the economy in railway construction then prevalent would turn out in the future to be a source of heavy and endless expenditure when the traffic increased, and the demands upon the permanent way became



THE GRADIENTS OF THE G.N.R.

more severe. Many of the monuments of constructional skill which rendered noteworthy the completion of the Great Northern main line stand to this day in their original form, and are likely to do so for many years to come.

The principal feature of any main line of railway, from the railway point of view, is, of course the grading of the road. In this particular the main line of the G.N.R. could not be termed exactly difficult, whereas it is by no means easy. The general ruling grade is 1 in 200 but a long ascent at even this



comparatively easy incline will tell severely on a locomotive with a heavy train, reducing the speed sometimes to forty miles an hour, or even less. It may be interesting to note briefly some of the principal gradients.

The start from King's Cross is not auspicious. A level  $\frac{1}{4}$ -mile is succeeded immediately by  $1\frac{1}{2}$  miles of stiff ascent at from 1 in 105 to 110, through the Maiden Lane and Copenhagen tunnels, in which the rails are generally more or less greasy, to Holloway. A brief  $2\frac{3}{4}$  miles of level road are followed by the noteworthy bank which extends from Wood Green to Potter's Bar, 8 miles of unbroken 1 in 200, so that to pass this station,  $12\frac{3}{4}$  miles out of King's Cross, in anything under 20 minutes from the start, with a heavy train, is excellent work. The line now falls at gradients from 1 in 200-350 for 6 miles to beyond Hatfield, rising to a final summit near Knebworth, after a further 5-mile climb mostly at 1 in 200.

From this point, 24 miles out of London, one of the two fastest running stretches on the down journey commences, the main line having a generally falling tendency as far as Offord, 32 miles distant. The steepest portion of the descent is the 8-mile length from Stevenage to Arlesey, past Hitchin, of which 5 miles are at 1 in 200. Beyond Huntingdon a short 3-mile bank brings us to Abbot's Ripton, and is followed by a subsequent  $4\frac{1}{2}$ -mile descent, both also at the ruling grade. The line is now comparatively level for some 18 miles, from Holme to Tallington, passing *en route* the Cathedral City of Peterborough, where, on account of the sharp curves north and south of the station, a very severe reduction of speed has to be made. On the level stretch beyond, at Werrington Junction, we come to the first set of track water-pick-up troughs out of London, the Great Northern having wisely realised the necessity of installing this necessary adjunct to long non-stop runs.

At Tallington commences the notable incline which continues thenceforward without a break for 15 miles to Stoke summit, 347 feet above sea-level, and the highest point on the Great Northern main line. Stoke Box is almost exactly 100 miles from King's Cross. The stiffest portion of the ascent commences beyond Essendine, 5 miles being at 1 in 200, and the final 3 miles to the summit at 1 in 178. This bank is at times the scene of remarkable speed exploits on the up journey, most of the highest speed records on the G.N.R. having been attained during its descent.

The second long down-grade on the down journey now commences, continuing practically as far as Newark, some 20 miles, but it can rarely be taken full advantage of, seeing that Grantham lies  $5\frac{1}{4}$  miles from the summit, and that nearly all the fastest down expresses call at this town. The first  $5\frac{1}{2}$  miles are at 1 in 200, the next 3 miles to Peascliffe tunnel are not so severe, but are followed by a further 2 miles at 1 in 200, and 2 miles at 1 in 300, with easier grades thence to Newark. There is now a level stretch for 8 miles across the Trent valley, where are situated the second set of troughs close to Muskham church.

Beyond the end of this level stretch comes the Tuxford bank, starting near Crow Park with a mile at 1 in 300, and continuing with 3 miles at 1 in 200 to Tuxford. A further gradual rise for  $2\frac{1}{2}$  miles culminates at Askham summit, after which follows another steep descent, 2 miles at 1 in 200, and  $1\frac{1}{2}$  miles at 1 in 178, to Retford. Beyond this town the line still falls very gradually for a further  $6\frac{1}{2}$  miles to Scrooby, between which station and Bawtry, on a short level stretch, are found the third and last set of track-troughs. After Bawtry occurs another short rise to Piper's Wood summit,

with a corresponding descent beyond, both of  $2\frac{1}{2}$  miles at 1 in 198. From this point the line remains fairly level until Askern Junction, four miles beyond Doncaster, where the metals of the G.N.R. join those of the middle partner in the East Coast Route—the North-Eastern Railway.

On certain of the branch and subsidiary main lines, however, much steeper grades than those mentioned are encountered. For instance, trains leaving Leeds for Bradford are encountered with a rise of 1 in 50 between Holbeck and Armley, this gradient also occurring between Woodkirk and Batley West, and between Dudley Hill and Lowmoor, in the West Riding district. Between Lofthouse North and Lofthouse East there is a gradient of 1 in 49, while from Drighlington to Batley West there is the steepest gradient of the whole system—1 in 40-50 for 3 miles. The summit level of the Great Northern Railway is between Thornton and Denholme, in the Keighley district, and is 877 feet above sea-level. From this brief description it will be seen that the grading of the Great Northern Railway, generally speaking, is of such a character that, while not altogether difficult in itself, the long grades occasion a considerable amount of "collar-work" on the part of the locomotives when hauling the heavy loads now standard on all the principal expresses.

*(Owing to unavoidable delay in preparation of drawings, the conclusion of this article is held over until next issue).*

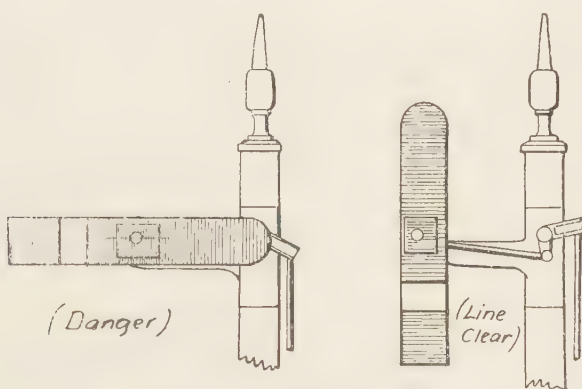


BY CECIL J. ALLEN.

*(Continued from page 174.)*

The peculiarly characteristic type of signal in use on the Great Northern Railway owes its inception to an appalling railway disaster which took place on this line on January 21st, 1876, at a small station called Abbot's Ripton, between Huntingdon and Peterborough. It occurred in mid-winter, during a very severe snowstorm. The type of signal then in use on the G.N.R. was one in which the arm worked in a slot in the post, and the snow drove with such force that either the slot of the down distant signal became completely choked while it was in the "off" position, or the weight of the snow on the arm depressed it so that it showed "line clear." This was before the days of electric repeating arms in the box, and the signalman was quite unable to see the "distant" owing to the blizzard prevailing at the time. The first portion of the disaster was that the up Scotch express ran into a coal train which was being shunted, and was completely wrecked, although, curiously enough, this did not result in loss of life, but only in considerable damage to rolling stock. As a result, however, of the down distant signal being "off" when it was thought to stand at danger, the down Leeds express dashed at full speed into the wreckage, making it ten times worse than it was previously and causing a number of fatalities.

To guard against future accidents from this cause, the Great Northern management then adopted an entirely original type of signal, in which the arm, instead of working on a spindle fixed to or through the post, was attached at its centre to a bracket extending from the side of the post. As a result of this arrangement, the arm is balanced about its centre, so that the weight of the spectacle frame and working rod alone are generally quite sufficient to keep it in the correct danger position, except in cases where there is a very long connecting wire from the box. An identical pattern of arm is used for main and relief lines, shunting operations being conducted entirely by means of ground discs. The distant signal is also identical with the "home," save for having the regulation fish-tail cut out of the outward end. As regards painting, the white stripe on the red side of the arm, and the black stripe on the white side, are often painted in the exact centre of the arm, that is, on the spindle plate.



G.N.R. BALANCED-ARM  
SIGNAL

Our sketch gives a general idea of the arm, and serves as an illustration of both home and distant signal. It will be seen that the bracket is fixed to the front of the post, and carries a spindle working through the post, operating both the front and the back spectacles. The back spectacle is unique: instead of obscuring the back-light when the arm is in the "off" position, it is fitted with blue glass, so that the back-light shows white when the signal is "on," and blue when it is "off." This arrangement is superior to the usual method of obscuring the back-light, so long as blue lights are not used for any other signalling purposes. A bell-crank lever is fixed to the spindle and worked by the upright rod; when the weight is raised and the weight pushed up, the arm is pulled into the "off" position, and is pushed into the horizontal when the arm returns to danger. When the arm is correctly pulled off, it occupies an exactly vertical position. For certain shunting indications a diminutive arm is employed, conforming otherwise in construction to the standard full-sized pattern.

Our next article will include further working drawings of G.N.R. Signals, which will show the lamp and spectacles, and also particulars of the standard ground discs. The information has been kindly supplied by the Company.

(To be Continued).



## A FEW NOTES ON THE GREAT NORTHERN RAILWAY CO.'S GOODS ROLLING STOCK.

To the ordinary traveller the goods rolling stock of a railway company is never very interesting. All it means to him usually is a dirty lot of wagons. To the one interested in model work, however, each vehicle has some special attraction. But it is not until a visit has been paid to one of the leading wagon works that one realises the amount of work that is connected with the conduct of this department.

It was the writer's privilege some months ago to visit the G.N.R. wagon works near Doncaster, in company with a member of the drawing office.



FOUR REPRESENTATIVE EXAMPLES OF G.N.R. GOODS STOCK.

- |                                       |                              |
|---------------------------------------|------------------------------|
| (1) New G.N.R. 15-ton Wagon.          | (2) G.N.R. Refrigerator Van. |
| (3) The well-known G.N.R. "9 tonner." | (4) G.N.R. Goods Brake.      |

The Great Northern Railway Company is one of the few leading lines that still depart from the usual custom of painting their goods rolling stock lead colour. Until some years ago they were painted brown oxide and picked out in black. In order to economise, however, all the upper work is painted red oxide, and only the wheels, "W" frames, and lower ironwork black. All roofs of the covered vehicles are white.

One of the most familiar wagons on the East Coast Route is the G.N.R. 9-ton open goods, and there are over 20,000 of these vehicles in use. This well-known wagon, however, is now no longer made, and the modern ones are of larger capacity. The G.N.R. are well known for the neatness



of their vehicles, and in new stock they are now endeavouring to adopt a standard wheel-base of 10' and an overall length of body of 19', without buffers.

The goods brake-vans, of which there are three types, viz., 10, 15, and 20 tons, are all of the same size, and, in addition to the lettering G.N.R., have the district and also the guard's name on. The boarding in the new ones are vertical, and not horizontal. Among some of the special vehicles may be mentioned the banana van, which is a standard 8-ton covered goods wagon, but fitted with vacuum brakes for express traffic, steam heating apparatus inside to keep the necessary temperature for ripening the fruit in transit, and is also lettered "banana." A train consisting of these vehicles only is very often seen on the main line. Another type of vehicle much used on the G.N.R. is the 5 and 6-ton covered fish vans, which are also fitted with vacuum brakes for express traffic, and are used in the Grimsby fish specials. Some of them have the wood-centre carriage wheels.



#### TWO SPECIAL G.N.R. GOODS VEHICLES.

- (1) 40-ton Well Wagon for conveying boilers and heavy machinery.
- (2) 35-ton Open Wagon. This Wagon has bogies of the American type.

Their refrigerator vans, like most other companies', are painted white, with letters in black, and upper ironwork brown oxide as wagons, and main frames and underwork black. They are also fitted with a ladder at both ends. All the vehicles that are fitted with vacuum brakes have a white star on the sole-plate as an indicating mark.

Other special wagons in use are express open goods with tarpaulin bar and vacuum brake, 9-ton open goods with special frame for vegetables, 20-ton coal wagon with bottom doors, 30-ton all-steel bogie wagon, open loose fish truck with curved ends and tarpaulin bar.

Our illustration shows a 40-ton "well" wagon. This has a length over buffers of 52' 9"; bogie centres are 40' 6" each, with a wheelbase of 5' 9". The "tare" weight, including timbers, is nearly 30 tons.

## THE EXPRESS TRAIN SERVICES OF THE GREAT NORTHERN RAILWAY.

IN days gone by the Great Northern Railway shared with the Great Western a joint reputation as the pioneers of speed in travelling in this country, upheld to a great extent in popular imagination by the exploits of such racing machines as the "Lord of the Isles" class on the G.W.R., and Stirling's magnificent eight-foot singles on the G.N.R. Since then, although train-loads have increased enormously, the Great Northern in this respect having but few rivals in this country, this company can hardly be said to have maintained the premier position in the matter of booked average speeds, simply because external conditions, principally those of competition, have



THE "FOUR O'CLOCK" OUT OF KING'S CROSS.

not demanded it. Certain competitive services have been accelerated; others, alas! have been decelerated. In the latter case I refer to the express trains with which the G.N.R. is most popularly associated—those of the East Coast Route from London to Scotland.

It may be news to some readers that, as far back as 1888, the 10 a.m. "Flying Scotchman" out of King's Cross was booked officially for a short time to York in  $3\frac{1}{2}$  hours, whereas its present time is 3 hours 42 minutes, and the fastest run to that city is 3 hours 35 minutes, or a deceleration of 5 minutes on the times of twenty-two years ago. Not only so, but in the memorable "Race" of August, 1895, when the East and West Coast Companies threw

schedule times to the "winds," Aberdeen,  $52\frac{1}{2}$  miles from London, was reached by the East Coast train in 520 minutes—8 hours 40 minutes—whereas the present fastest time is  $11\frac{1}{4}$  hours by the same train. However, the G.N.R. must not be blamed for this; for the sake of the country's reputation as to fast travelling such lack of improvement in speed for so many years as that which has characterised the Anglo-Scottish train services is unfortunate, but it is due to the agreement into which the East and West Coast Companies entered, after the deplorable smash at Preston on the L. & N.W.R., that the times between London and Scotland should never be cut below certain fixed minimum figures. It may be remarked here that, comparatively moderate as are the booked speeds on this service, it is extremely doubtful whether the expresses could be accelerated in their present form, as it is all that the locomotives can do now to keep time over this road with loads frequently between 300 and 350 tons.

However one may mourn the comparative decadence in speed of the East Coast Joint trains, there is no such evidence of stagnation as regards expresses purely Great Northern. This line is in the happy position of being both the shortest and easiest route to many of the principal centres of competition in the West Riding of Yorkshire, such as Leeds and Bradford, but has nevertheless accelerated the train services so that the fastest expresses are still a credit to a line with a past history of speed such as is possessed by the G.N.R. The fastest train on the Leeds service is the 2 p.m. "Special Express" from Leeds to London, which also makes the longest non-stop run on the G.N. system. The time from Leeds to London,  $185\frac{3}{4}$  miles, is an even  $3\frac{1}{2}$  hours: from Wakefield, where through coaches are attached from Bradford and Huddersfield, the run is non-stop to King's Cross, the  $175\frac{3}{4}$  miles being covered in 189 minutes, at an average speed of 55.8 miles per hour. The train is comparatively light, consisting usually of five bogies and a restaurant car—approximately 200 tons—and always time well in hand throughout the journey. This is the fastest train in operation between Leeds and London. Both the 7.50 a.m. breakfast car express and the 10.15 a.m. luncheon car express also run up from Leeds in the slightly increased time of 3 hours 40 minutes, the former running non-stop from Retford to London,  $138\frac{1}{2}$  miles, in 153 minutes, average 54.3 miles per hour.

The service from London to Leeds, curiously enough, is not quite so fast as that in the reverse direction, although it contains one or two smart runs. Of these the most noteworthy is that made by the 3.15 a.m. newspaper express ex King's Cross, invariably a light train, which runs non-stop to Doncaster, 156 miles, in 169 minutes, 55.4 miles per hour average. This train reaches Leeds in 3 hours 44 minutes from London. The same run used also to be made by the erstwhile 9.45 a.m. London-Leeds express, but this train was, in recent years, combined with the 10.20 a.m. Nottingham and Sheffield express to form a new joint 10.10 a.m. train, calling at Peterborough and Grantham. This express boasts the fastest down time to Peterborough, covering the  $76\frac{1}{4}$  miles in 82 minutes, an average of 55.8 miles per hour, and also makes a fast run from Grantham to Doncaster in 55 minutes, the  $50\frac{3}{4}$  miles requiring a 55.4 miles per hour average speed. The latter run is also the fastest regular start-to-stop schedule over this length, although the 2.20 p.m. Scotch express from London is booked to cover the distance on Sundays in 52 minutes—average 58.6 miles per hour. This fast timing, however, is scarcely ever observed, since the very moderate booking from Doncaster on to York allows any lost time to be regained before York is



reached. The fastest remaining Leeds train is the 1.30 p.m. ex King's Cross—the fastest train on the service—which makes the journey in 3 hours 42 minutes, calling at Peterborough, Doncaster, Wakefield and Holbeck. Peterborough is reached in 83 minutes, and the  $79\frac{3}{4}$  miles thence to Doncaster are scheduled 88 minutes, or 54.4 miles per hour average.

The fastest trains on the Great Northern system are found in the Sheffield and Nottingham services, but these are generally of light formation. Again, the up trains are faster than the down, this curious practice being directly opposite to that prevailing on all the chief lines running out of London. The best train is the 4.48 p.m. ex Sheffield, which runs up to London to 2 hours 58 minutes, calling at Grantham only. The  $105\frac{1}{4}$  miles from Grantham to London are covered in the very fine time of 110 minutes, an average of 57.4 miles per hour. The 6.5 p.m. down Sheffield express from London is only a fraction less fast, running to Grantham in 112 minutes—56.4 miles per



A "DOWN" EXPRESS, GREAT NORTHERN RAILWAY.

hour—and reaching Sheffield in the even 3 hours. Both these trains, together with the "Sheffield Specials" on the Great Central, were at one time booked in 2 hours 50 minutes for the non-stop journey, but the two lines have now decelerated to the present figures, the fastest time from London now being that of the 3.15 p.m. G.C.R. down express which reaches Sheffield at 6.12 p.m. On the Nottingham service the 11 a.m. up express from Nottingham (Victoria) is the fastest on the G.N.R., covering the  $76\frac{1}{4}$  miles from Peterborough to London in 79 minutes, or 57.9 miles per hour average. The run from Grantham to Peterborough in 32 minutes is also very smart, the 29 miles involving an



initial  $5\frac{1}{4}$  miles ascent at 1 in 200 to Stoke summit. This train, however, is very light, rarely exceeding a load of two bogies and a restaurant car, or about 110 tons, but a time of 2 hours 25 minutes with three stops from Nottingham to London, against the Midland non-stop  $2\frac{1}{4}$  hours over a route 5 miles shorter, is certainly a remarkable performance.

The Anglo-Scottish expresses, for reasons previously described, do not offer anything remarkable as regards speed, the fastest run being that of the 8 p.m. Highland express ex King's Cross, which runs from Grantham to York,  $82\frac{3}{4}$  miles, in 91 minutes, an average of 54.6 miles per hour. During the summer the first portions of the "Flying Scotchmen" in either direction (10 a.m. ex London and Edinburgh, together with the special 11.20 a.m. down Scotch express run non-stop between London and Doncaster in from 182 to 184 minutes. Two joint Great Northern and North-Eastern trains—the 5.30 p.m. ex King's Cross and the 8 a.m. ex Newcastle make good runs, the former from London to Grantham in 117 minutes, and the latter from Doncaster to London non-stop in the even 3 hours. The 5.30 p.m. down express is now the only train remaining with a 3 hours 35 minutes booking from London to York, and is the fastest train from London to both York, Darlington and Newcastle.

This brief article gives a fairly comprehensive survey on the modern express train services of the Great Northern Railway, and, read in conjunction with the article on the engineering features of the line as regards grading and service slacks, the reason why higher speeds can be booked over certain portions of the line, as, for instance, from Grantham to York, will be readily understood.

[Since the above article was written the new July timetable has been received. We notice that the 3.15 a.m. newspaper train (non-stop Doncaster) has been discontinued.—EDITORS.]



### SEEN FROM THE CARRIAGE WINDOW.

G.N.R. BRIDGE NUMBERS.—Every bridge, both under-line and over-line, on the Great Northern Railway, is numbered for reference purposes, the numbers being painted in black on oval white plates fixed direct to the side of the structure. In the case of small culverts, which have no parapet at the permanent-way level, the plate is fixed to a small wooden post, which is fixed at the side of the line above the culvert.

ARRANGEMENT OF RUNNING LINES.—The Great Northern is one of the few important railways which, in such places as it has four running roads, does not arrange them in pairs—up and down "fast," and up and down "slow"—but lays the relief lines on either side of the main line, so that the two up roads and the two down roads are together. The great advantage of this idea is that it becomes much easier to transfer slow passenger and goods trains to and from the main line between the running express trains than with the ordinary system of "fast" and "slow" roads, in which one of the roads in the opposite direction also is bound to be blocked when any train crosses from "fast" to "slow." Its chief disadvantage is that the connection to every branch line renders imperative a "flying junction" in order that the main line may be kept as clear as possible. Examples of this are given by the High Barnet branch at Finsbury Park, and the Enfield branch at Wood Green.

## DONCASTER WORKS AND ITS LOCOMOTIVES.

THE legend "Great Northern Ry. Co., Makers, Doncaster Works," which we see inscribed on the neat oval brass plate carried by all G.N.R. locomotives, conjures up in the mind a vista of busy men and machines, pulleys and belts, grime and noise, which one forgets when one sees the "finished article," either spick-and-span outside the running shed or careering along through the green fields at the head of a heavy train.

It was my privilege quite recently to visit the justly famous works at Doncaster, over whose destinies during the last half century the trio of engineering geniuses, Mr. Sturrock, Mr. Stirling and Mr. Ivatt, have presided.



DONCASTER WORKS LOCOMOTIVE.

This Engine, No. 533, was built at Doncaster in 1878, and converted to a Crane Locomotive in 1906. It lifts  $3\frac{1}{2}$  tons and has cylinders  $18\frac{1}{4} \times 24$  and driving wheels  $5' 8''$  dia.

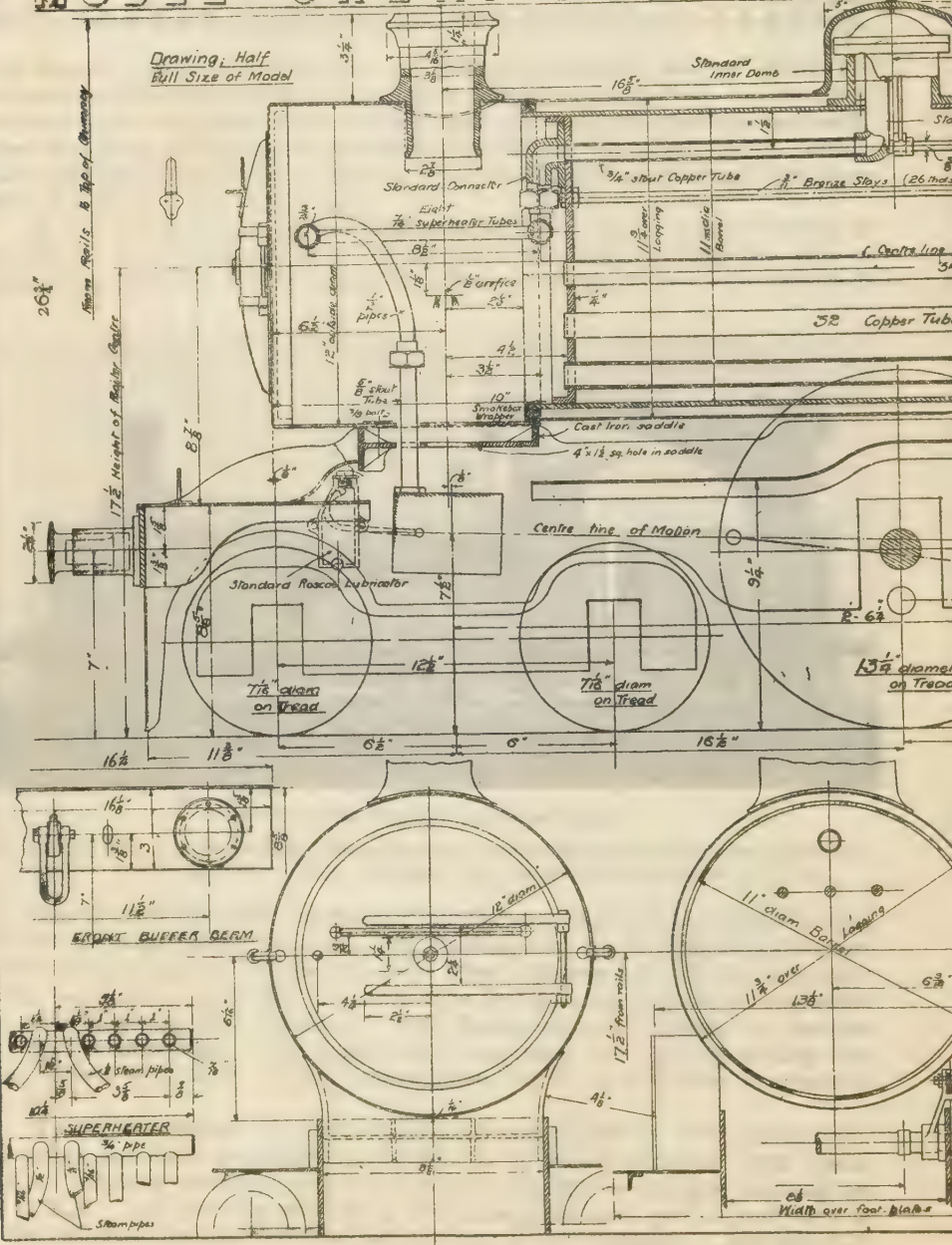
Mr. Sturrock will be well remembered for the introduction of steam tenders, and for his bogie single No. 215. Mr. Stirling and the G.N.R. 8-footers are always linked together in the minds of those interested in the development of the locomotive, while Mr. Ivatt was the first British engineer to recognise the advantages of the "Atlantic" type locomotive by building the famous No. 990 in 1898, and a few years later improving the type by adding the large boiler with wide firebox, exemplified in the well-known locomotive No. 251.

We do not intend to dwell on the history of the G.N.R. locomotive. This work has been accomplished in Mr. G. F. Bird's excellent little book, and our drawing therefore only includes such engines as are now running on the G.N.R. All the diagrams are to the same scale, and give a good idea as to the relative dimensions of the locomotives of this company. But more of this anon.





MODEL - GREAT - NORTH - E - R N





# RELY "ATLANTIC" LOCO

Sheet No 1

2 inch Scale.  $9\frac{1}{2}$ " Gauge

Working Pressure 100 lbs

274

1 Pop Valve  
5" diam

\*scale Regulator

Cast Gunmetal  
Roof Girders

### inch Outside Diameter

Contracting Red 2018 centres

13 $\frac{1}{4}$ " diameter  
on Tread

Reversing Rod  
on R.H side

*Samuel G. Smith*  
May 1910

13  $\frac{3}{4}$ "

16<sup>n</sup>

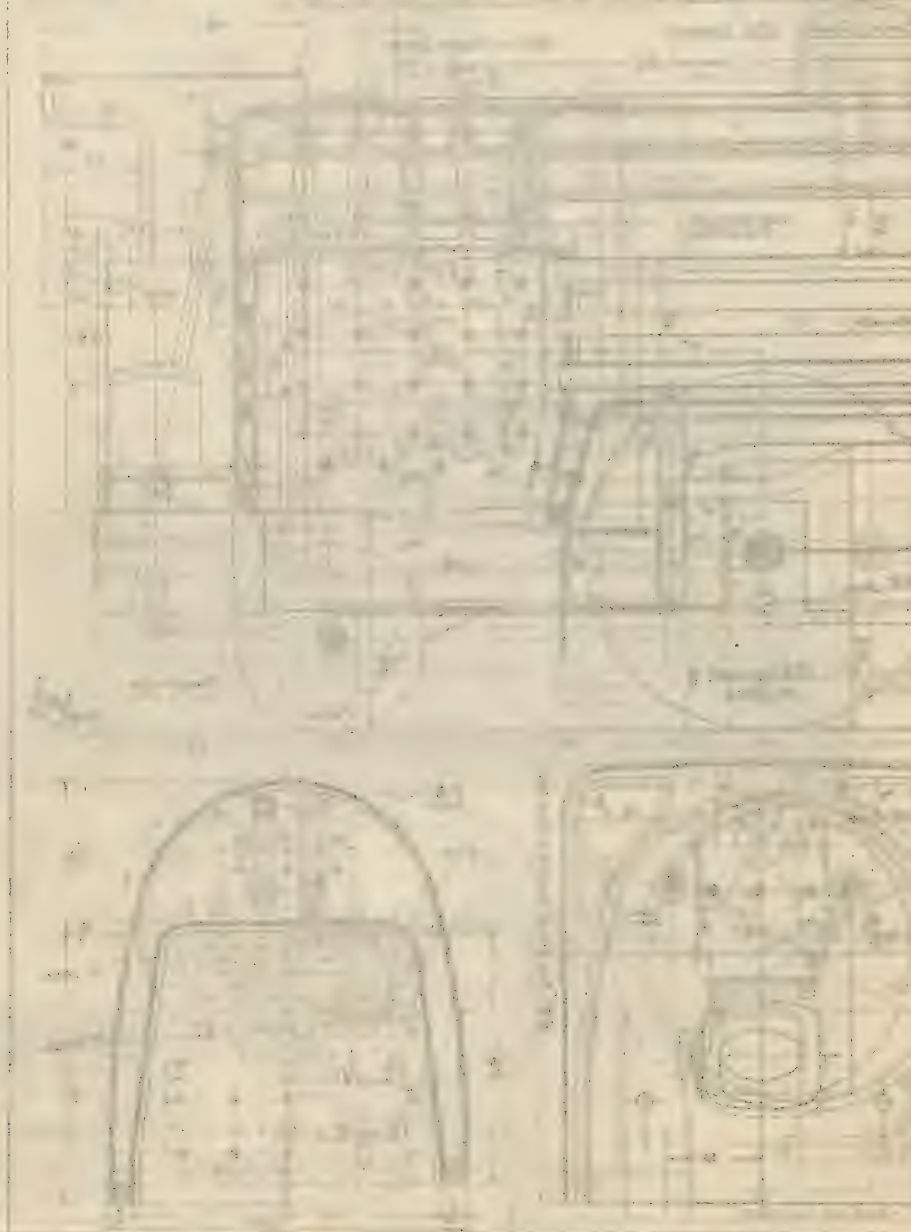
500

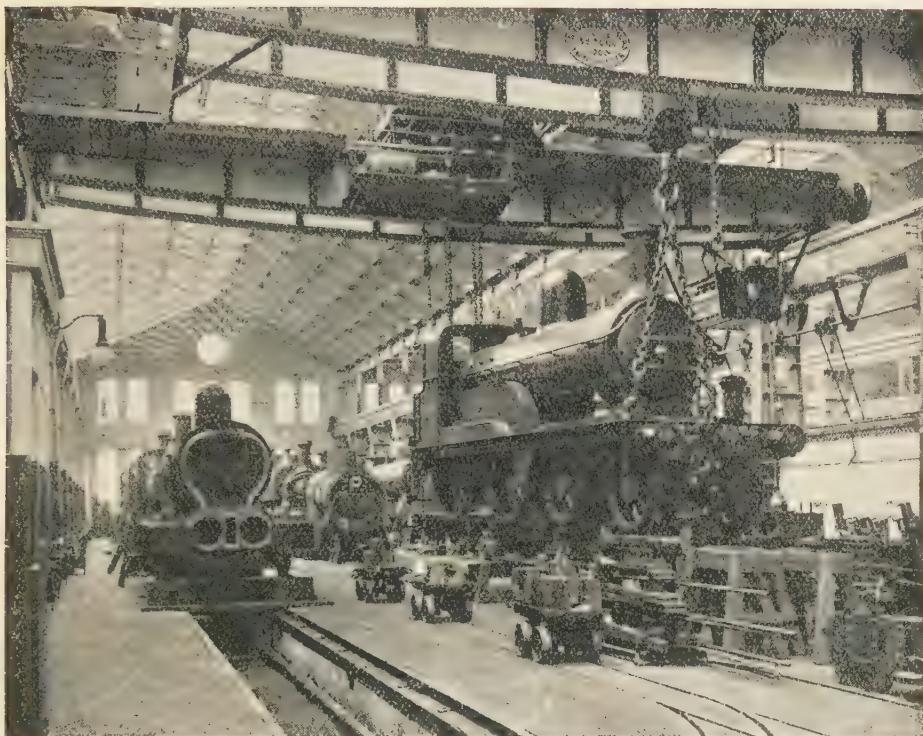
16  $\frac{1}{8}$ " from level of Foot plate to top of Roof.

[illegible]

1870-1871

1870-1871



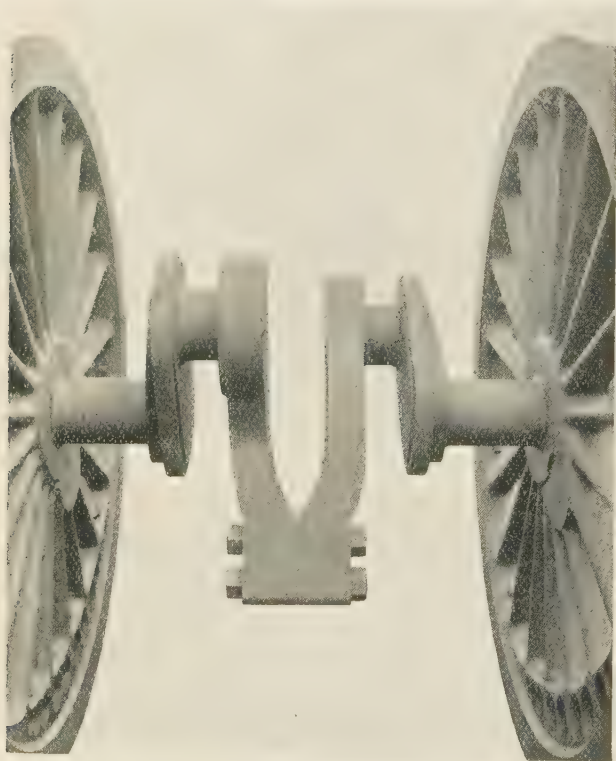


TWO VIEWS OF THE NEW ERECTING SHOP AT DONCASTER.  
(The upper picture shows over-head crane lifting 4-4-0 type loco.)



We made our journey to Doncaster in the 10-10 a.m. down express, and, presenting our letters of introduction directly after the mid-day hour of recess, we were handed over to the Drawing Office to be provided with a guide round the works, an office well filled by one of the premium pupils serving his time under Mr. Ivatt at Doncaster.

Those who are acquainted with the financial interests of our great railways will know that the motto of the spending departments of the Great Northern management is "economy with efficiency," and in no branch of the service is this exemplified better than in the loco. department. We believe that the department costs for the same unit of work done about



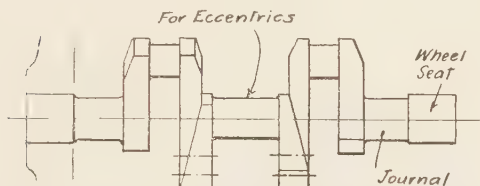
PHOTOGRAPH OF  
MR. IVATT'S  
PATENT  
BUILT-UP CRANK  
AXLE, AS FITTED  
TO COMPOUND  
ENGINE  
NO. 1421.

two-thirds the amount spent by another company whose initials only differ in one particular: and who will say that G.N.R. locomotives do not do their work well and pull loads equal to those common on any other of our great lines.

The Great Northern Railway, however, does not sit still. Where there is a chance of a valuable improvement in locomotive construction being obtained at the cost of a thorough trial and experiment the G.N.R. authorities do not hold back. We have seen Mr. Ivatt's comparative trials of compound, simples, multi-cylinder simple engines and convertible engines. We also remember his experiments to settle the relative drawbar pulls of coupled and uncoupled engines at various speeds, the results of which appear to be reflected in the continued absence of six-coupled express passenger engines on the G.N.R.



Now we see Mr. Ivatt giving a careful trial to the superheated engine, and in the machine shop at Doncaster Works we noticed undergoing the processes of boring, facing, etc., the large 21" cylinders intended for the new series of ten "Atlantic" locomotives of the No. 1442 class which will be shortly placed into service, fitted with Schmidt superheaters. The cylinders will of course be fitted with piston valves, and therefore differ considerably from those employed in all the other "Atlantic" locomotives, in which the

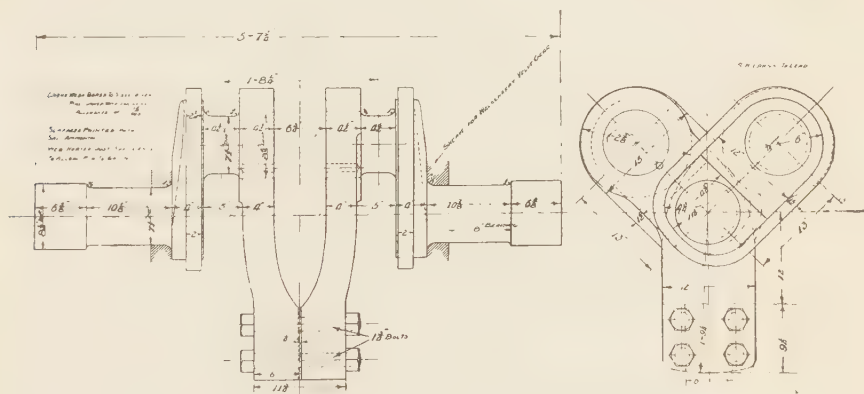


MR. IVATT'S CRANK AXLE  
ARRANGED FOR  
AN INSIDE-CYLINDER  
LOCOMOTIVE.

valves (slide valves) are arranged to exhaust through the back, a design which the writer thinks is one of the many good points which go to make the G.N.R. loco such an economical machine.

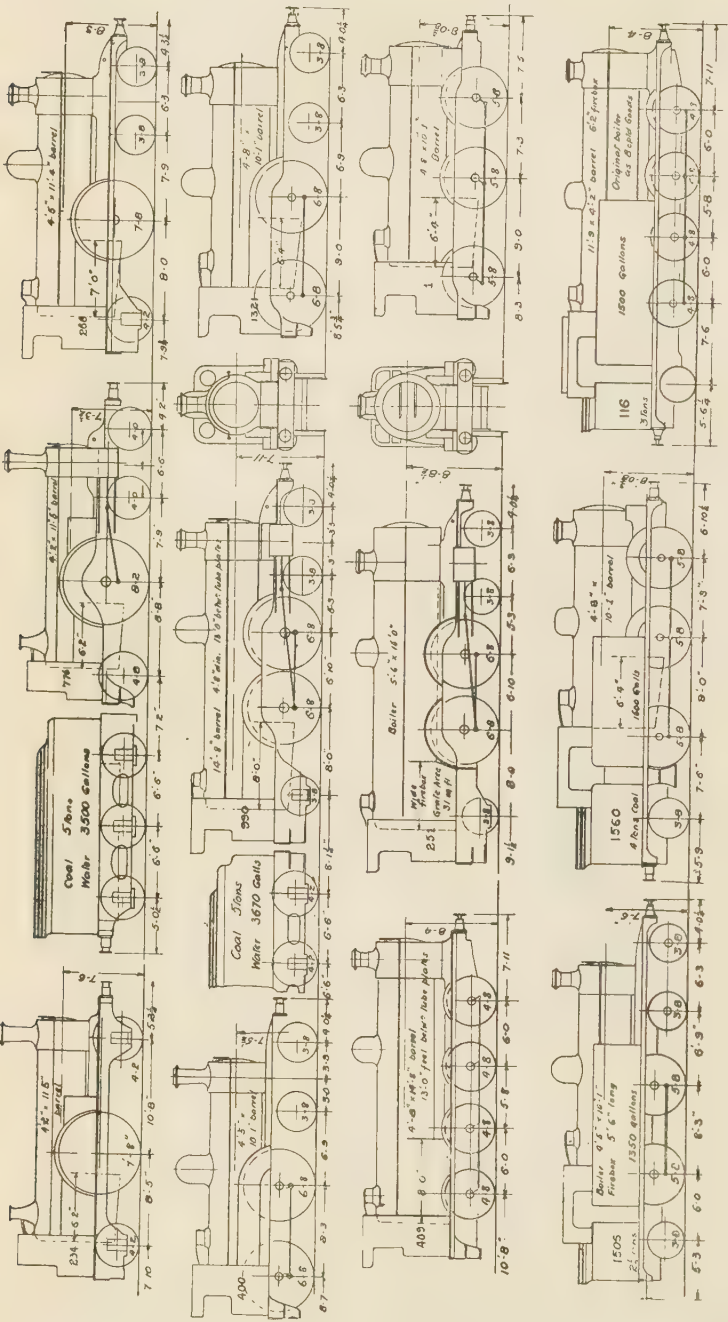
We also saw the boilers for these engines under construction. They will have the usual row of large 5½" tubes at the top to contain the small tubes forming the superheater.

Naturally, in viewing the works, the subject of conversation turned to Mr. Ivatt's patent crank axle, and we understand that further developments of the idea are being tried practically. Engine No. 265—one of the 7' 7" bogie singles—has been fitted with an axle made in three pieces instead of



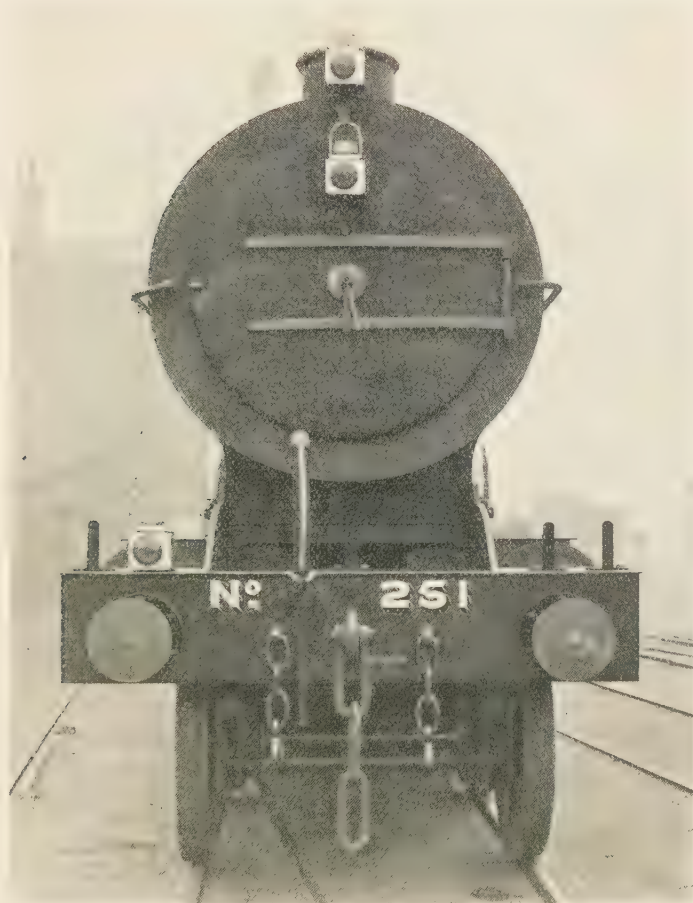
DRAWING OF AXLE FITTED TO ENGINE NO. 1421.

being divided in the centre. This is done to get the cranks farther apart and allow the usual straight piece between the cranks for fixing the eccentrics used in an ordinary inside-cylinder link-motion engine. We were, however, informed that No. 265 has been fitted with Joy's valve gear. The axle fitted to No. 1421 compound consists of two main parts, each of which is in two pieces, as the drawing herewith kindly lent by Mr. Ivatt shows. The outside webs are solid with the journals and crank-pins. The balanced webs are bored to the sizes given, and the crank-pins are turned with a shrinking



allowance of  $\frac{16}{1000}$ ". The surfaces are then painted over with a solution of sal-ammoniac, and the balanced webs are heated just sufficiently to allow the pin to go in. The webs are further secured by a round key pin, and they are bolted together with firm  $1\frac{3}{4}$ " dia. bolts, a tongue joint 6" wide, relieving the bolts of any torsional strains.

Space prevents a detailed description of the works with the machinery they contained. We visited the forge, and saw the drop-hammers shaping



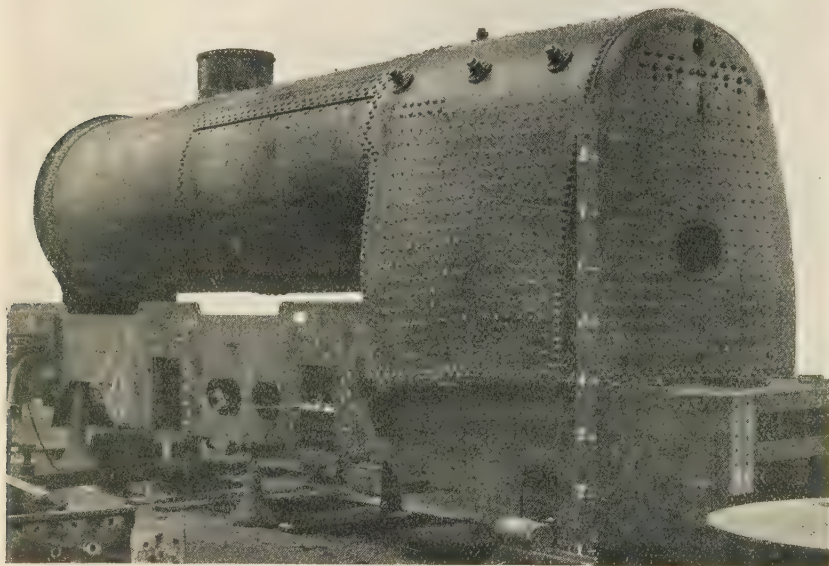
FRONT VIEW  
" ATLANTIC "  
ENGINE  
No. 251,  
FITTED WITH  
SPECIAL  
CHIMNEY  
EXPERIMENTED  
WITH SOME  
SHORT TIME  
AGO.

various parts at one blow. In the light machine shop, valve, valve spindles, brass work, boiler stays, link-motion parts were to be seen undergoing the various processes of manufacture.

The erecting shop of course attracts the most attention from the outsider. Here he sees a batch of locomotives in different stages of completeness, some with boilers and some without. At the time of our visit a series of ten goods engines (0-6-0 type) which bear the same relation to the new No. 1 class goods engines as the No. 400 class passenger locomotives do to the No. 1321 class, were in progress. They are labelled with big numbers—"1st" engine,

"2nd" engine, "3rd" engine and so forth, for purposes of identification. These engines have 5' driving wheels, and are fitted with the standard 4' 5" diameter boiler. The No. 1 class have 5' 8" wheels and 4' 8" boilers, as fitted to the No. 1321 passenger engines.

The new erecting shop is a short distance away from the main works, and is used for repairing work almost entirely. No. 990 was undergoing a "general" overhaul, and our photographs give an idea as to the arrangement of this portion of Doncaster works. The shop is fitted with a pair of 35-ton Craven travelling cranes, which are to be seen in operation in our photograph. This photograph exemplifies the use of the round hole to be seen drilled in



PHOTOGRAPH OF THE FIRST WIDE FIREBOX BOILER, AS FITTED TO  
"ATLANTIC" ENGINE, No. 251.

It will be noticed that the outside fire-box crown of this boiler sloped down towards the back. This practice is not continued in the later Atlantics.

the forward end of the main frames above the footplates of most all G.N.R. locomotives. This is designed to take a shackle, to which the hook of the overhead crane is attached when it is desired to lift the engine.

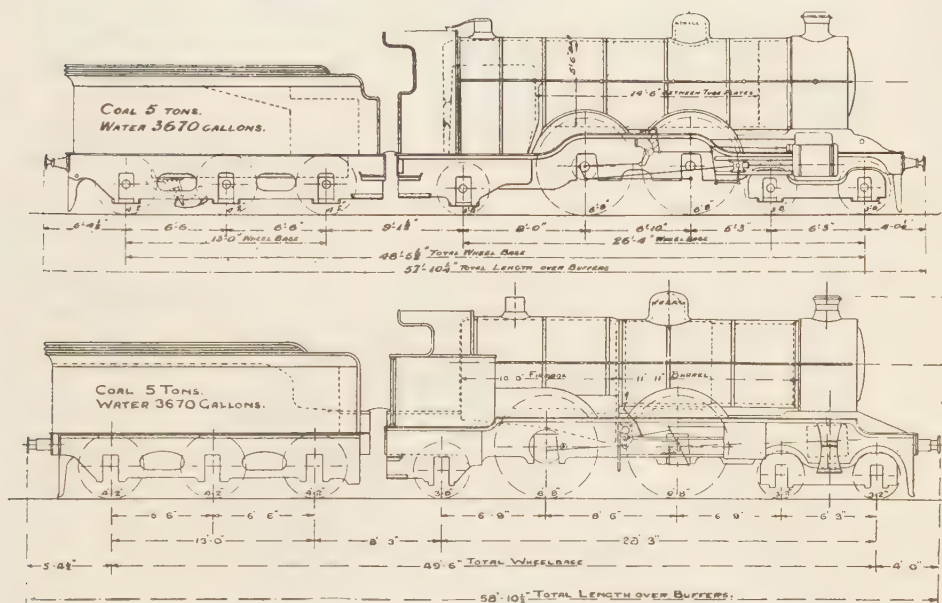
Leaving the works, we again "crossed the road," so to speak, and visited the paint shop, where the livery of the G.N.R. engines is applied so tastefully and so well. Here we saw newly painted No. 1300, the four-cylinder compound designed and built by the Vulcan Foundry Co. for the Great Northern Railway as an experiment. In this shop we noticed on the vacuum pipes on the front of several locomotives a small plate bearing single letter in white raised letters. This, we were told, was an indication of the engine's position in the power classification of G.N.R. locomotives, and acts as a guide to the traffic departments in arranging the loads the engine is to haul.

Much more of interest could be said about Doncaster works, but the



limits of space prevent. Our chart gives a good idea of the locomotives of the G.N.R. The chief work of the line is done by three classes of engines, the singles, the 4-4-0's, and the 4-4-2's, the No. 251 class "Atlantics" taking the lion's share. Special mention must be made of the 4-4-0 engines of the 1321 class, which often are loaded with trains of nearly equal weight to those hauled by the "Atlantics," and appear to do the work allotted to them very efficiently. The single-wheelers do the lighter work, but are not so often seen on the London to Peterborough section of the line.

Of the Stirling eight-footers not many of the original class remain.



(1) MR. IVATT'S 4-CYL. COMPOUND OR SIMPLE ENGINE, NO. 1421.  
BUILT AT DONCASTER WORKS, AUGUST, 1907.

|                                           |                                                               |
|-------------------------------------------|---------------------------------------------------------------|
| Heating surface :—Tubes .. 2208.2 sq. ft. | Weight on coupled wheels, 36 tons.                            |
| Firebox 143.6 „                           | Weight of locomotive, 69 tons 2 cwt.                          |
| Total .. 2351.8 „                         | Total weight engine and tender, 110 tons.                     |
| Grate area, 31 sq. feet.                  | Inside cylinders 18" by 26"—L.P. when working as a Compound.  |
| Working pressure, 200lbs. per sq. in.     | Outside cylinders 13" by 20"—H.P. when working as a Compound. |

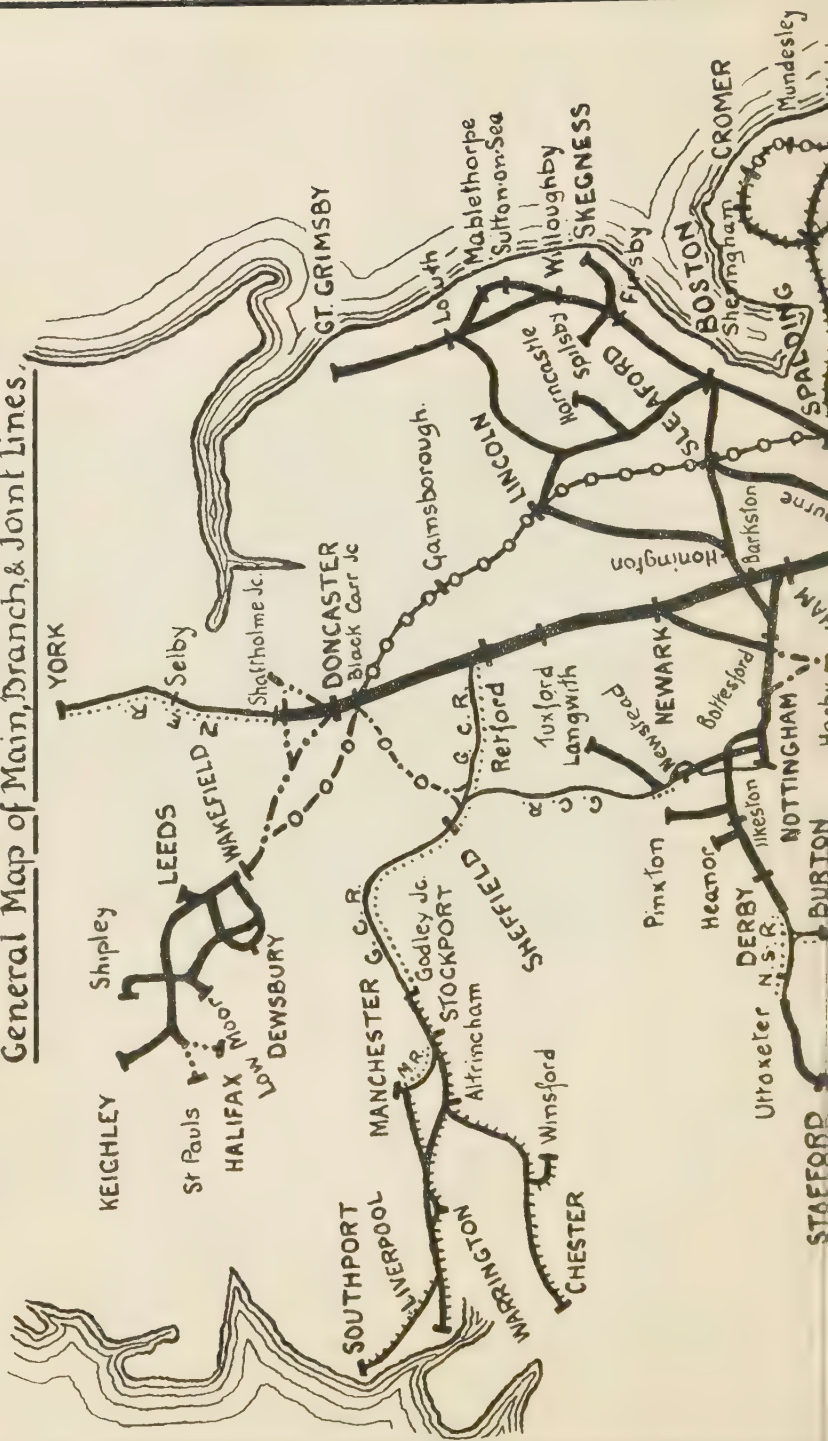
*The engine is fitted with a change valve, which enables it to be worked continuously, either as a Simple or Compound.*

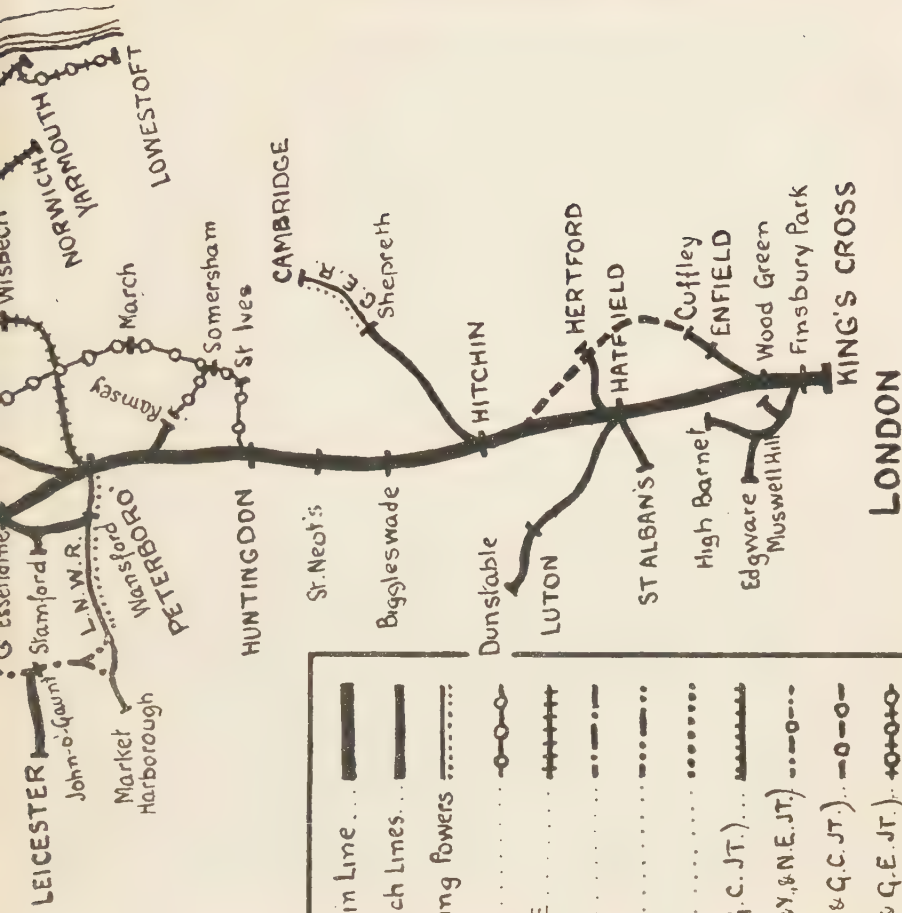
(2) 4-CYL. COMPOUND ENGINE, DESIGNED AND BUILT BY THE  
VULCAN COY., LTD., NO. 1300, JULY, 1905.

|                                            |                                                     |
|--------------------------------------------|-----------------------------------------------------|
| Inside cylinders 23" diam. by 26" stroke.  | Grate area, 31 sq. feet.                            |
| Outside cylinders 14" diam. by 26" stroke. | Working pressure, 200lbs.                           |
| Heating surface :—Tubes .. 2344 sq. feet.  | Weight on coupled wheels, 37 tons.                  |
| Firebox 170 „                              | Weight of locomotive, 71 tons.                      |
| Total .. 2514 „                            | Total weight of engine and tender, 111 tons 18 cwt. |

# THE GREAT NORTHERN RAILWAY.

General Map of Main, Branch, & Joint Lines.





C.J. ALLEN  
1910

|                                                                |       |
|----------------------------------------------------------------|-------|
| GREAT NORTHERN RAILWAY—Main Line...                            | —     |
| " " Branch Lines...                                            | —     |
| " " Running Powers...                                          | —     |
| G. N. AND G. E. JOINT LINE...                                  | —o—o— |
| MIDLAND AND G. N. JOINT LINE...                                | ++++  |
| G. N. AND L. N. W. JOINT LINE...                               | —     |
| G. N. AND G. C. JOINT LINE...                                  | —     |
| G. N. AND L & Y. JOINT LINE...                                 | —     |
| CHESHIRE LINES (MID. G. N. & G. C. JT.)...                     | —     |
| S. YORKSHIRE RLY (G. N., MID., G. C., L. & Y., & N. E. JT.)... | —o—o— |
| DEARNE VALLEY RLY (L. & Y., G. N., & G. C. JT.)...             | —o—o— |
| NORFOLK & SUFFOLK (G. N., MID. & G. E. JT.)...                 | +o+o+ |

## THE GREAT NORTHERN RAILWAY.

THE Great Northern Railway this year celebrates its Diamond Jubilee, the main line having been opened throughout in the year 1850. As early as 1836 a direct line from London to York was mooted, in conjunction with an alternative system via Cambridge, but only the latter scheme was sanctioned by Parliament, and that merely as far as Cambridge. The present main line of the G.N.R. was proposed in 1844, and, after a protracted struggle with a rival project—the “Direct Northern”—an amicable settlement was arrived at, and the amalgamated systems received parliamentary sanction in 1846. Four years was the time occupied in construction—comparatively brief for the period—and the line was opened, as previously stated, in 1850.

For the next thirty years the Great Northern Railway was engaged in an incessant battle with the London and Cambridge line—the Eastern Counties Railway—owing to the desperate efforts of the latter to obtain an outlet in the north beyond the limited sphere of the eastern counties, and to secure some portion of the traffic from the Yorkshire coal-fields to London. In each succeeding parliamentary struggle, however, the G.N.R. was victorious, owing to the more efficient service offered, but matters were compromised in 1879 by the arrangements made whereby the Great Eastern Railway—as the rival line had now become—was to be made part owner of the March and Spalding line of the G.N.R., together with the Spalding, Lincoln, and Doncaster line then sanctioned, while the G.N.R. became also part owner in the Great Eastern line between Huntingdon and March. This was the genesis of the Great Eastern and Great Northern Joint line, giving the G.E.R. free access to the north, while leaving untrammelled the G.N. main line.

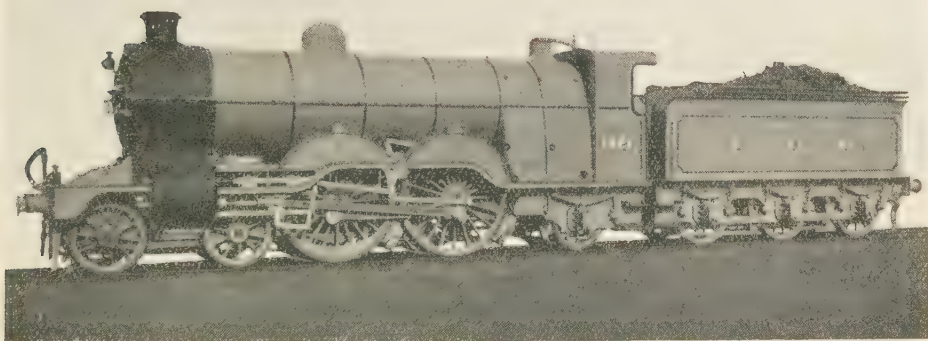
The other great historical fight occurred in 1871 with several lines, but notably the Midland. For ten years, from 1858 until the opening of the Bedford—St. Pancras extension in 1868, the Midland Railway had running powers over the Great Northern Railway from Hitchin into London, with the result that, at times, the main line was choked with trains, and traffic became completely disorganised. Shortly after the Midland opened to London, they withdrew the facilities previously enjoyed by the G.N.R. as to the carriage of coal from the Derbyshire coal-fields, so that the Great Northern immediately lost a quantity of traffic of considerable value. As the only adequate measure of retaliation possible, a line was then proposed from Nottingham to Ilkeston, thence extended, under encouragement from the locality, to Derby and Stafford, cutting right through the Midland territory and, amid strenuous opposition from the latter company, the bill was sanctioned by Parliament. The line is one of considerable engineering interest, to which reference is made in another article. Every railway probably owns portions of line remote from its own recognised “territory,” but it always strikes the observer as distinctly odd to find the Great Northern Railway in Stafford. These two paragraphs deal with the outstanding features in the history of the present Great Northern Railway, which has otherwise been one of steady progress and expansion.

The G.N.R. is not a large line as compared, say, with the 2,690 miles of the Great Western Railway, being only 737 miles in length, but it is of considerable importance, forming, as it does, one of the three partners in the East Coast Route between England and Scotland—the shortest route from London to Edinburgh, Dundee, Aberdeen, and all the eastern side of Scotland. The Great Northern Railway in itself also forms the shortest route to all



parts of the North-Eastern Railway system, including York, Hull and Newcastle, in addition to having the fastest service to such English towns of importance as Leeds, Wakefield, Bradford, Halifax, and Huddersfield, and Peterborough.

The G.N. main line runs from King's Cross to a point known as Shaftholme Junction, 4 miles beyond Doncaster and 160 miles from London, stopping "in the middle of a ploughed field"—as the constructing engineer reported to the directors—and there joining the metals of the North-Eastern Railway, the centre partner in the East Coast Route. By means of running powers, however, the Great Northern works the whole of its passenger and goods traffic through into York, before handing it over to the N.E.R. The Great Northern line out of London has a certain peculiarity in the pronounced scarcity of branches or ramifications for many miles. Beyond short branches in the London district to High Barnet and Enfield, from Hatfield to St. Albans, Hertford, Luton and Dunstable, from Hitchin to Shepreth, for

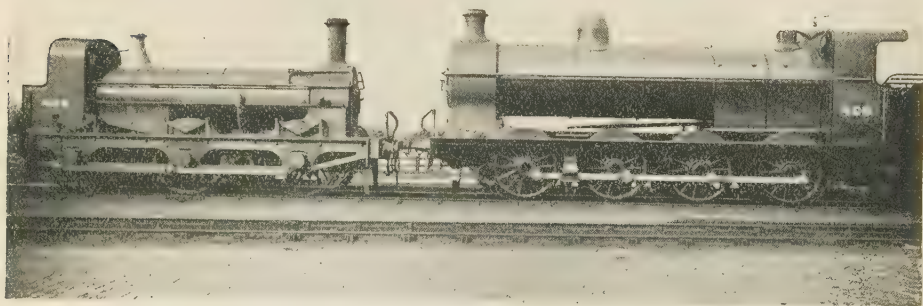


ONE OF THE LATEST G.N.R. PASSENGER EXPRESS ENGINES.

(See page 219 for drawing and dimensions).

Cambridge, and from Holme to Ramsey, totalling in all only 78 miles, the main line continues in splendid isolation as far as Peterborough, 76½ miles out. The Enfield branch, however, has recently been extended for 5 miles to Cuffley, as a first instalment of a loop line which, travelling via Hertford, and giving a direct service from that town, will rejoin the main line at Stevenage, and form a relief line for this length. At Werrington Junction, just beyond Peterborough, the main Lincolnshire line diverges on the right, running via Spalding and Boston to Skegness, Mablethorpe, Louth and Great Grimsby. At Grantham, 105½ miles out, the important Nottingham line branches to the left, with its continuation to the Derbyshire and Staffordshire coal-fields via Derby and Stafford. On this route running powers are exercised over the North Staffordshire Railway for 12¾ miles from Egginton Junction, near Burton, to Bromshall Junction, near Uttoxeter. At Barkston, 4½ miles beyond Grantham, the Lincoln line leaves on the right, with connections to all the other principal towns on the Lincolnshire system; but beyond this there are no further branches, save the Nottingham and Newark line, which joins the main line on the left at Newark, until Doncaster is reached.

At Retford the G.N.R. crosses the Great Central Lincoln and Sheffield line on the level—the scene of the historical exploit of Sturrock's famous "single-driver," No. 215, which cut clean through an old M.S. & L. goods train crossing its path—and makes important connections. Curiously enough, the G.N.R. also possesses another of the very few railway level-crossings extant, since the main line crosses the Midland Nottingham and Lincoln branch on the level just North of Newark. Running powers are in force over the G.C.R. throughout from Retford to Manchester, and then over the Cheshire lines, in which the Great Northern is a part owner, to Liverpool and district. These are, at present, used only for goods traffic. From Doncaster the Leeds main line is joint with the G.C.R. as far as Wakefield,



GREAT NORTHERN GOODS LOCOMOTIVE No. 409. PAST AND PRESENT.

[This interesting photograph shows Mr. Ivatt's eight-coupled goods engine, together with the old "Sturrock" engine it replaced. The older engine is specially noteworthy as being one of the engines originally fitted with a steam tender, *i.e.*, a tender fitted with a separate engine and the six wheels coupled. Anent these it was averred that they were not a success because "the boilers were not large enough for two engines." This statement has not been justified, as it is absurd to say that Mr. Sturrock would have continued to make engines which ran short of steam. Mr. Sturrock once wrote, saying that *mechanically* the steam tenders worked very well, but he added "there were other difficulties." "Some of our drivers don't like working what they call two engines and getting only pay for one." The engines could haul 70 or 80 wagons, and as "the traffic department will not extend the lie-by sidings delay is caused."] ]

but from this point the G.N.R. has a network of its own lines serving Leeds, Bradford, Dewsbury, Keighley and other important West Riding towns. The Great Northern Railway is also part owner in several important lines, as previously mentioned; these are the Midland and Great Northern Joint line, from Peterborough to Lynn, Norwich, Sheringham, Cromer, and Yarmouth; the Great Northern and Great Eastern Joint line, from Huntingdon to March, Spalding, Lincoln, Gainsborough and Doncaster; the Cheshire Lines Committee (G.N., G.C., and Midland Joint), from Manchester to Warrington, Liverpool, Southport and Chester; and the L. & N.W. and G.N. Joint line from near Market Harborough to Bottesford. Besides these, there have also been recently constructed for goods traffic only, principally in view of the opening of the South Yorkshire coal-field, the Dearne Valley Railway from Wakefield, and the South Yorkshire Railway (Joint G.N., G.C., N.E. L. & Y., and Midland), from the Sheffield district, both joining the Great Northern main line near Black Carr Junction, Doncaster.

The foregoing paragraphs give an indication of the scope and extent of the Great Northern Railway, which is also illustrated by the accompanying map of the system. All details connected with the engineering, rolling stock, train services, and other features of operation are amply dealt with elsewhere, but a few statistics relative to the G.N.R., which applied at the close of 1909, may be of interest. The capital of the company is £51,451,185; the expenditure for 1909 was £3,935,530, of which no less than £1,047,828 was spent in locomotive power: the receipts totalled £6,117,705. The dividend declared on the ordinary stock was at the rate of  $3\frac{7}{8}$  per cent. During the year 1909, 37,163,264 passengers were carried, excluding season-ticket holders, and 20,156,465 tons of coal and merchandise, involving a train mileage of 21,919,107, divided in the ratio of 12,389,006 passenger miles to 9,530,101 goods and mineral miles. The total amount of rolling stock owned by the company on December 31st, 1909, was as follows:—1,279 locomotives, 894 tenders and 6 rail motors; 119 first-class carriages, 149 second-class (second-class is used in the suburban district only), 1,426 third-class, 754 composites and saloons, 53 restaurant cars and 733 other coaching or passenger stock vehicles; also 39,861 merchandise and mineral vehicles of different kinds.

Several noteworthy details of railway working owe their inception to the Great Northern Railway, among which two are of exceptional importance. In 1876 the G.N.R. discarded "white" as a signal light, and substituted "green" as the "all right" indication, a practice which has since been universally adopted in this country. It is impossible to contemplate the difficulty which a modern locomotive driver would have in picking out his signals in the neighbourhood of towns, were the white signal-light still in use, considering the many other white lights liable to be confused with those of the signals. The other epoch-making lead given by the Great Northern Railway was in the matter of restaurant cars, which now-a-days we are accustomed to see on every express train of any importance at all. On November 1st, 1879, the first dining saloon in existence was placed on the London and Leeds service by the G.N. management for the use of first-class passengers only. A long period elapsed before these facilities were extended to other services as it was 1893 before restaurant cars were placed on the East Coast Joint service between England and Scotland—passengers at this time were allowed 20 minutes at York to lunch or, rather, to attempt this somewhat dangerous gastronomical feat. It is rumoured that in these benighted days, the management of the restaurants paid particular attention to serving the viands at furnace heat, in order to ensure a profit in the case of all travellers save those whose internal organs were made of leather or some kindred fabric. The reason is obvious—very few hungry mortals got beyond the soup stage, although, of course, the cost was "inclusive." One twelve-wheeled dining-car made its appearance in 1895, and the first complete vestibuled train in 1897, so that the latter travelling refinement has had a comparatively brief life. At the present time, of course, every express is composed of corridor coaches of the most approved pattern, generally vestibuled together, and no less than thirty trains are provided daily with restaurant accommodation during the summer months.

These few facts concerning the history and present development of the Great Northern Railway will serve as introductory to the detailed articles dealing with those departments of the railway—the locomotive, carriage and wagon, engineering, signalling and express train services—which are of more especial interest to our readers.



## THE GREAT NORTHERN RAILWAY CARRIAGES.

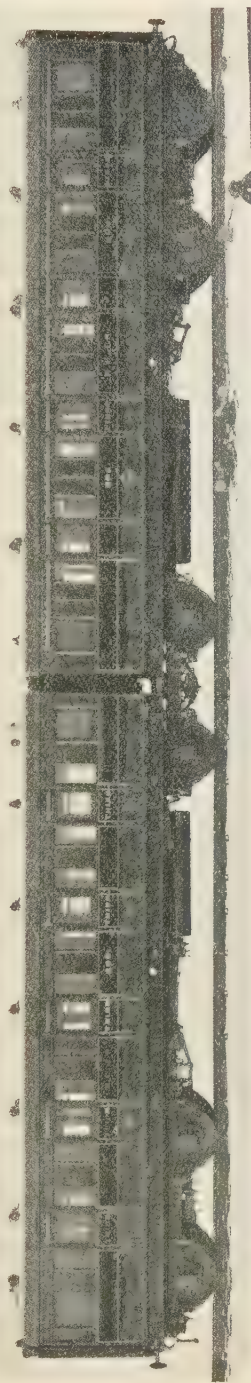
THE carriages of the Great Northern Railway have so many points of interest that we could fill this issue with valuable notes as to their construction. However, we are only able to touch upon some of the outstanding features of G.N.R. practice. At our recent visit to Doncaster Works we were able to inspect in progress the conversion of several six-wheeled carriages into bogie stock. This system, which is illustrated in the photograph herewith, is the subject of a patent taken out by Mr. H. N. Gresley, who is chief of the department at Doncaster. It has for the last two or three years been subject to thorough tests. The two six-wheel coaches have their axle-guards, scroll irons, &c., removed, and the drawbar and buffing gear at one end of each are also taken out. The headstocks at these ends are strengthened by means of 12" steel channels, to which are attached brackets lapping one over the other. The diagonals are also reversed. A king-bolt passes through the brackets and forms the centre-pin for the middle four-wheel bogie, and two standard four-wheel bogies support the other ends of the coaches. The vehicles thus transformed occupy slightly less length of track than as originally built, and while supported on the same number of axles as formerly, they have gained immensely in flexibility and ease of running as compared with their original condition as six-wheeled stock having rigid axles at each end, and side play to the middle axle, since owing to the flexibility of the two coaches in regard to each other the three bogies are able to adapt themselves exactly to the sharpest curves likely to be worked over. Another feature of the conversion is that all wheels are braked, which is not the case in six-wheeled carriages. Another interesting point in modern G.N.R. carriages is that the waist rail, *i.e.*, the rail at the bottom of the windows, is 2" lower than it used to be. This, combined with the practice, in corridor stock especially, of reducing the size of the vertical window rails, gives the interior of G.N.R. carriages quite a light and airy appearance. Two types of ends are employed on the G.N.R. coaches, the well-known curved ends common to all the vestibuled stock and the straight or flat ends employed for ordinary carriages and corridor carriages which are not vestibuled.

One of the latest products of Doncaster is a 50' invalid saloon. This vehicle is 9' wide with vestibuled curved ends and the new standard elliptical roof. It has the following compartments:—Two first-class corridor compartments, invalid's room with separate bed, two toilet and a luggage compartment. The carriage is arranged for day or night use.

While we inspected various examples of the standard carriages, the best that the G.N.R. can do is evidenced in the royal train, which when not in use remains sheeted down in the works at Doncaster. We have to thank Mr. Gresley for particulars of this train.

The saloon, built at the Doncaster Works of the Great Northern Railway, for the use of His late Majesty when travelling on the East Coast route, is 67' long over the body, 9' wide  $\times$  12' 11" high from the rail-level to top of roof. It is constructed of teak, with a steel underframe, and is carried on two six-wheeled bogies. Entrance is obtained from double doors, opening inward, at each end; the mouldings round the panels and windows are





THE G.N.R. TWIN CARRIAGES.

New bogies 8' wheelbase; centres of bogies 30' 6". Total wheelbase 69'. Total length over buffers 79' 5½"; coach bodies 37' 6" long × 8' 6" wide. Total weight, 37 tons 9¼ cwt.



PHOTOGRAPH OF THE GREAT NORTHERN RAILWAY CO.'S ROYAL TRAIN, HEADED BY "ATLANTIC" TYPE LOCOMOTIVE, No. 274.

(The royal saloons are those with the special girder-form underframing.)

of gilt brass, and the centre of the bottom panels is ornamented with His Majesty's cipher. On each end of the doors are gilt grip handles, extending from the cornice to the floor. The outside panels are of specially selected figured teak, and the centre panel bears His Majesty's coat-of-arms. The roof is elliptical, and the outside appearance of the coach conforms generally to the standard type of the Great Northern and East Coast Joint stock. The windows are of bevelled plate glass, and are balanced so that they can very easily be lowered or raised.



G.N.R.  
THE LATE KING'S  
ROYAL TRAIN :  
DAY OR NIGHT  
SALOON  
ARRANGED AS  
DINING-ROOM.

Commencing at one end, the saloon is divided as follows :—Entrance balcony, smoke room, day saloon, bedroom or dining-room, dressing-room, attendant's compartment. The balcony is panelled with richly figured teak, and has a white panelled ceiling.

The smoking room is 10' long, and decorated in Jacobean style; the walls are of oak inlaid with boxwood and dark pollard oak. The furniture consists of two arm chairs and a large settee, upholstered in reindeer plush hide. The fittings are of oxidized silver.

The day saloon, which is 17½' long, is in Louis XVI. style, and the walls are of highly polished sycamore inlaid with trellis lines of pewter and light mahogany. The furniture, which is of light French mahogany inlaid with pewter and box, upholstered with silk brocade, consists of two arm chairs, a large settee and four smaller chairs. There is also a writing table, which is fitted with adjustable shaded electric lights. The use of pewter is a revival of an old French method, which has a very pretty effect in conjunction with mahogany.

Both the day and smoking rooms are lighted by rows of tubular electric lamps, concealed behind the cornices on each side, giving a very soft and restful light. There are also corner brackets in the smoking room, and handsome gilt wall brackets in the day compartment, the lights in the latter being shaded with hand-painted silk screens.

The bedroom, or dining-room, is 14' long, and the walls are panelled

and enamelled white, the furniture being in mahogany inlaid with kingwood, and covered with fine old rose-coloured silk damask with green silk embroidered cushions. When used for day journeys the bed is taken out and the compartment is converted into a dining-room.

The dressing-room, which is 8' long, is panelled and enamelled white.

Next to the dressing-room is the lavatory, the floor of which is covered with inlaid cork parquet flooring, and the walls are of fine Italian Cippolino marble crossbanded with white statuary marble.

The attendant's compartment is fitted up with electrically heated kettles, urns, etc., and a switchboard for controlling the lighting and heating of the carriage.

In order to give uniformity of effect the whole of these rooms, with the exception of the attendant's compartment, are carpeted alike with a fine plain Saxony pile old rose carpet, and all curtains and blinds are of soft green silk with white silk embroidery.

In addition to electric radiators the saloon is heated by means of warmed air, which is delivered into the various compartments through ducts from

G.N.R.  
The LATE KING'S  
ROYAL TRAIN :  
INTERIOR  
OF THE  
DAY SALOON.



electric blowers situate in the attendant's compartment. Ventilation is also afforded in the same way, and the air from the roof ventilators is extracted by means of electric exhausters.

The decoration and furnishing have been carried out by Messrs. Waring & Gillow, and Messrs. J. Stone & Company's system of lighting and ventilation has been fitted.

In addition to the saloon for His Majesty the King, two special saloons have been constructed for Royal suite and friends, which are vestibuled

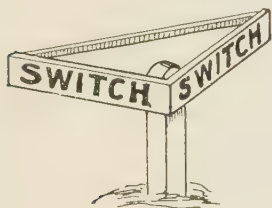


on to the royal saloon. These saloons are carried on four-wheeled bogies of special design with 10' wheelbase. The vehicles are 58' 6" long, and are fitted with easy chairs and couches upholstered in green tapestry. The partitions are so arranged that each of the saloons can be made into four bedrooms. The walls are enamelled white, and the doors are of richly figured mahogany. All the electric fittings, electroliers, etc., are of tasteful design, and gilt, with white silk shades.

To complete the train a saloon for H.M. Queen Alexandra has been built by the North-Eastern Company at York, but the King's carriage and all the other vehicles on the train were constructed at the Doncaster Works of the Great Northern Railway. Under the new reign no doubt some alterations will be made, but as to these we know not.

### "ON THE G.N.R."

**CATCH-POINTS.**—On steep inclines "catch-points" are fixed at intervals in the ascending road in order that any train or portion of a train which might break away when making the ascent, and commence to run backwards, may be derailed before colliding with the next train following. These points are indicated by a small post with two arms, placed at such an angle so as to be visible from either direction, and bearing the word "Switch." This is generally painted with black letters on a white ground, but occasionally also



CATCH-POINT BOARD.



G.N.R.  
MILE  
POST.

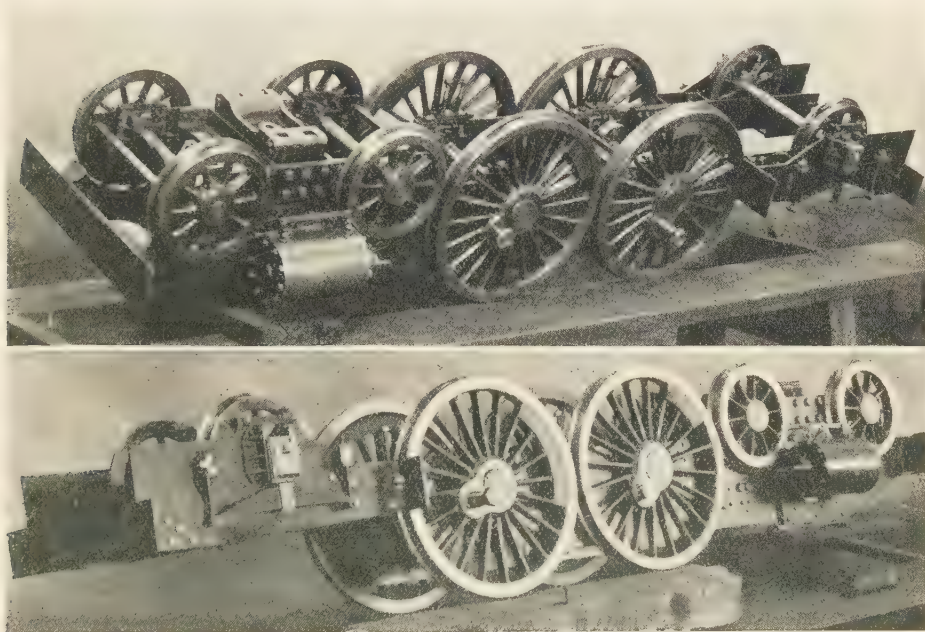
with white letters on a black ground. A catch-point is merely a small spring tongue laid "trailing" in the outer rail; trains ascending the incline close it by force, while, as the spring normally keeps it open, any coach or train descending would immediately take the open tongue as half of an open facing-point, and would be derailed on the "off" side of the line. These catch-points are also placed occasionally in sidings and other points where there is danger involved in certain movements of trains.

**MILE-POSTS.**—The mile-posts are placed at the usual quarter-mile intervals on the down side of the main line. They consist of a square wooden post, fixed corner-wise to the line, carrying at the top two metal plates, one facing diagonally to each direction, on which are painted the mileage. The quarter-mile posts show merely  $\frac{1}{4}$ ,  $\frac{1}{2}$  or  $\frac{3}{4}$ , as the case may be, the stripe of the fraction being painted, by the way, sloping, and not horizontally. The even mile-posts, which are about twice the size of the others, show the distance in miles from London. The posts and plates are painted white, with the figures and the edges of the plates black.



### A LARGE MODEL G.N.R. "ATLANTIC."

AT the time of writing a very fine model of the famous No. 1442 exhibition locomotive is being built to the order of a private gentleman at the Northampton works of Messrs. Bassett-Lowke, Ltd., in which the writer is endeavouring to reproduce as faithfully as possible the leading constructive features of Mr. H. A. Ivatt's admirable design. The locomotive will be the



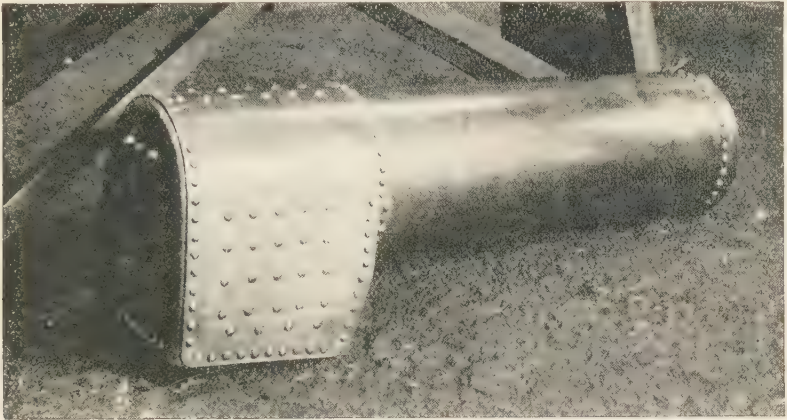
PHOTOGRAPH OF MODEL G.N.R. "ATLANTIC" LOCO DURING CONSTRUCTION.

largest scale model of this particular prototype yet built (excepting, perhaps, the excellent engine belonging to Mr. Holder which was described in our December issue, and which is a very close reproduction), and the fitting of real vacuum brakes will also be attempted.

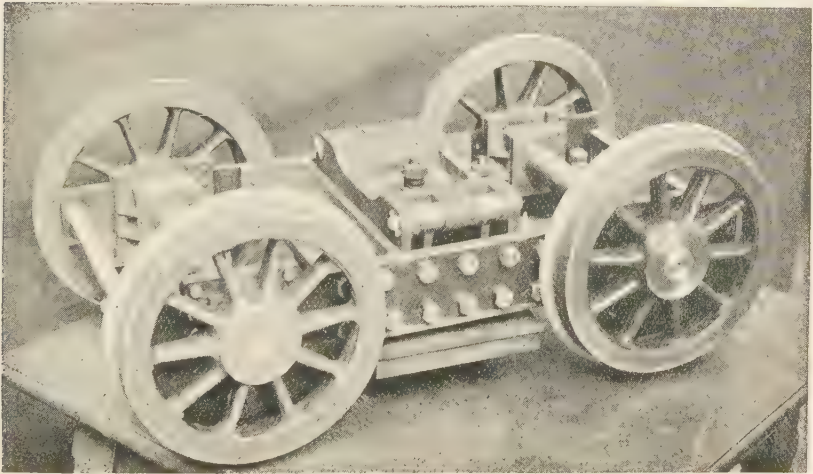
In copying the original drawings lent by Mr. Ivatt, the first consideration of the writer has of course been the provision of the first-class working model which will give the best results on the road, and, secondly, the prohibitive cost of an absolute scale model in every particular has rendered a certain amount of simplification necessary. However, no leading feature possible in a practical working model has been omitted. The bogie is of the proper swing-link type, the boiler has a wide firebox of scale over-all dimensions and shape, the frames at the trailing end are arranged in the same manner as the prototype, and furthermore, the tender is of the latest design with differential wheelbase.



The writer not being able to say much as to what the finished engine will do or look like, the following notes will deal more particularly with the details of the design. The central plate is a general arrangement of the engine which principally gives an idea of the design and arrangement of the boiler, which is of course the outstanding feature of Mr. Ivatt's creation.



DETAIL PHOTOGRAPH OF BOILER FOR 2" SCALE G.N.R. "ATLANTIC."



PHOTOGRAPH OF BOGIE FOR 2" SCALE MODEL G.N.R. "ATLANTIC"  
TURNED UPSIDE-DOWN TO SHOW THE SWING LINKS.

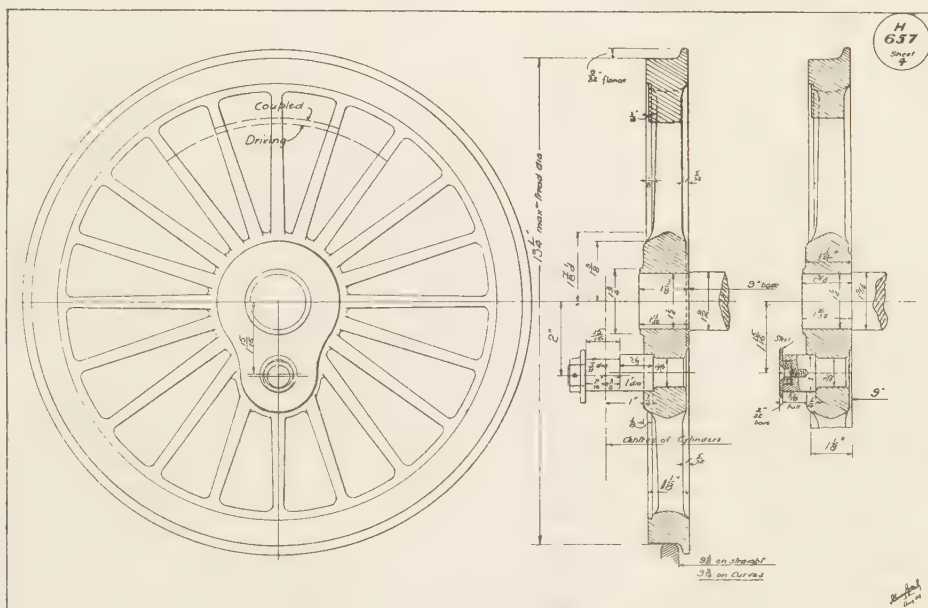
The boiler is built entirely of copper, which material has the advantage of being practically indestructible and in a way to counterbalance its cost. Furthermore, a model copper loco boiler can, nominally at least, be made more powerful than a steel boiler of the same exterior size. The reason is







this: A copper boiler, although the material is in itself much weaker, and the strength also falls with high temperatures, may be made of thinner plate than a steel boiler, because in a steel boiler the plates must be thicker than necessary for mere strength to allow for the comparatively rapid corrosion which takes place when such a boiler is used intermittently. The use of thicker plates makes the boiler much more coarse, and this coarseness reduces the internal dimensions of boiler firebox and reflects adversely on the arrangement and number of the boiler tubes. In this model  $\frac{3}{16}$ " boiler plate is employed, and, failing the provision of a piece of 11" tube for the boiler-barrel,



DRAWING OF DRIVING WHEEL, SHOWING HOW MR. H. A. IVATT'S  
DESIGN OF CRANK PIN IS MODELLED.

this is made of a single piece of plate, the seam being riveted together with a double row of rivets. The stays are  $\frac{1}{6}$ " diameter, of bronze screwed with a fine thread and riveted over. The tubes are of copper,  $\frac{3}{4}$ " diameter, and are expanded in, the wide firebox, as is obvious, allowing the maximum number of tubes the barrel will carry to be fitted, without causing any difficulties in the expanding-in of the tubes at the firebox end.

As already mentioned, the bogie is of the swing-link type, the detail drawing prepared by the writer for this part of the model being reproduced herewith (see page 232). The character of the original locomotive has been carried out as faithfully as possible in designing this bogie. The length of the swing links, and the thicknesses of the metal in the various parts has, however, been increased, in the one case to provide for a greater amount of lateral play, and in the other to provide sufficient strength, cast iron being used for all the main castings. The swing links are of gunmetal, although cast mild steel may be employed if time available is sufficient.

The springs of the bogie are arranged exactly the same as in the prototype, namely, separately for each axle, and attached by spring bolts to a bridge casting over the axlebox.

The valve gear is almost a replica of the original, but is slightly larger in all dimensions than a mere scale reproduction would provide. The eccentrics are solid with the driving axle, so that the straps may be kept within reasonable limits. The links are longer and heavier, but the position behind the leading coupled axle, the cranked intermediate valve rod, the swinging supporting link, are practically the same as in the prototype. No intermediate valve spindle is however, employed, the valve spindle being provided with a tail rod and dummy gland to give it the necessary support.

Another feature of interest in this model is the method in which the particular design of crank pin which Mr. Ivatt uses on his "Atlantic" type locomotives, has been reproduced in miniature. As all students of the locomotive know, a certain proportion of our locomotive engineers prefer a comparatively short throw for the crank pins of all coupling rods, the late Mr. Stroudley (L.B.S.C.R.) and Mr. Dugald Drummond being the earlier exponents of this practice. Under ordinary circumstances, with an outside-cylinder four or six-coupled locomotive this is not possible. Mr. Ivatt, however, obtained the desired results by an eccentric crank-pin on the driving wheel, the outside portion having a centre  $\frac{1}{2}$ " further away from the centre of the axle than the inside portion. In this way the cylinders may have a stroke of 24", and the coupling rod a travel of only 23". In the model the cylinders are  $2\frac{3}{8}$ "  $\times$  4" stroke, and the coupling rods have a pitch circle of  $3\frac{7}{8}$ " diameter, the eccentricity of the pin being  $\frac{1}{16}$  of an inch, as shown on page 235 herewith.

The leading dimensions of the locomotive are as follows:—

#### MODEL $\frac{1}{8}$ TH FULL SIZE G.N.R. LOCOMOTIVE.

|                                                            |                                              |
|------------------------------------------------------------|----------------------------------------------|
| Cylinders, $2\frac{3}{8}$ " diam. $\times$ 4" stroke.      | Length of tender frames, 41 $\frac{1}{2}$ ". |
| Driving wheels, 13 $\frac{1}{4}$ " diam. on tread.         | Wheelbase of tender: Rear, 12".              |
| Bogie wheels, 7 $\frac{1}{16}$ " " "                       | " " " 14". Front,                            |
| Tender wheels, 8" " "                                      | Weight of engine, 650lbs. loaded.            |
| Length of main frames, 5' 6 $\frac{1}{8}$ ".               | Weight of tender, 300lbs., without           |
| Total wheelbase, 4' 4 $\frac{3}{4}$ ".                     | passenger.                                   |
| Coupled wheelbase, 13 $\frac{3}{4}$ ".                     | Gauge of rails, 9 $\frac{1}{2}$ ".           |
| Boiler barrel, 11" diam. $\times$ 33 $\frac{1}{2}$ " long. | Tractive effort at 100 lbs. pressure,        |
| Boiler firebox, 13 $\frac{3}{8}$ " long $\times$ 13 wide.  | 170lbs.                                      |
| Boiler tubes (32) $\frac{3}{4}$ " outside diam.            | Maximum load on level, 2 tons.               |

#### G.N.R. GRADIENT POSTS.

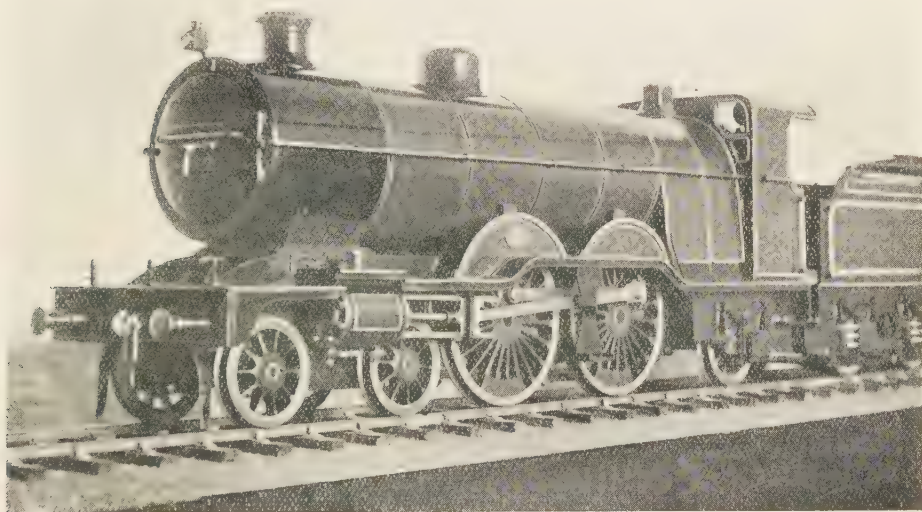
GRADIENT POSTS.—The gradient posts are also situated on the down side of the main line, and are of the usual pattern. They are painted white, with black figures.

#### SPECIAL SOUVENIR.

IN connection with this issue, we have had a special medal or watch chain pendant struck. It is about  $\frac{3}{4}$ " diameter, and executed in bronze, and on the front has a representation of a G.N.R. express train treated in low relief, and on the reverse side the name of our journal and a space for engraving initials or name. This medal has been made by one of the best makers in England, and as an advertisement we are offering same to our readers at cost price, viz., 1/- post free. It can be obtained direct from our Editorial Offices, or from Messrs. Bassett-Lowke's London or Northampton addresses.

**CAPTAIN F. C. MOORE'S 3 $\frac{1}{4}$ " GAUGE MODEL G.N.R. LOCO,  
No. 1442.**

THIS model was specially built for Captain F. C. Moore at Northampton during the first three months of the year, and although made to the drawings used for the standard model 3 $\frac{1}{4}$ " gauge locomotives of this type, it embodies many refinements which cost alone often prevents being added to a working



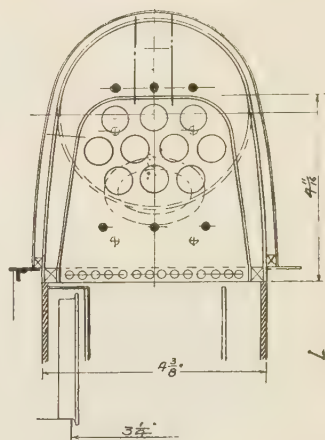
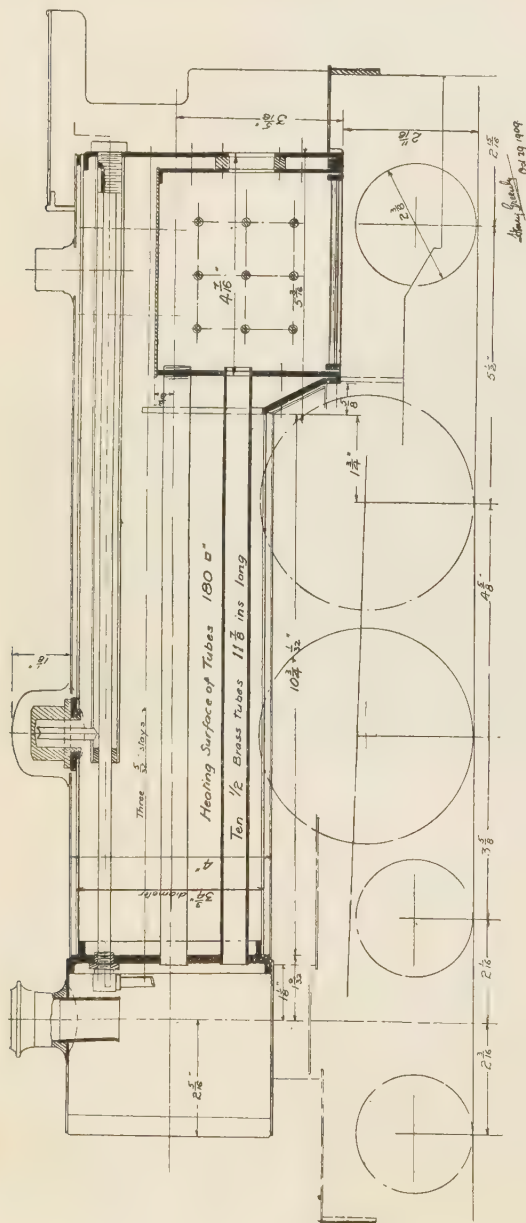
CAPTAIN F. C. MOORE'S MODEL 3 $\frac{1}{4}$ " GAUGE G.N.R. "ATLANTIC" LOCOMOTIVE, FITTED WITH PROPER LOCO-TYPE BOILER BURNING SOLID FUEL.

model. However, those who have the time to do the work themselves may adopt them either singly or in their entirety with the assurance that the result will be satisfactory.

In the first place the boiler is of the proper locomotive type with flue tube and a grate for burning solid fuel, the design for this portion of the model being reproduced herewith. It will be observed that the wide firebox of the prototype is retained, together with the sloping throat-plate. The barrel and firebox wrapper are made from one piece of 3 $\frac{3}{4}$ " diameter tube, the latter being formed by splitting and opening out the tube and brazing in a thick throat-plate which is not flanged, but has a butted joint. The main inside frames are continuous, and are cut away to allow of the deepest firebox. In addition, the grate bars are made of round rod, so that as little vertical height is wasted as is possible.

The arrangement of the regulator is more or less new. The standard

regulator is fitted to the back plate, and has the usual steam-pipe leading to the smokebox. As far as the dome it is cased by a light tube of larger diameter, which feeds the inlet hole in the regulator body. The tube is screwed on. The annular space between the tubes is connected by a vertical pipe to the steam dome, which is of hexagonal shape, and readily removable so that it also forms a filler for the boiler.



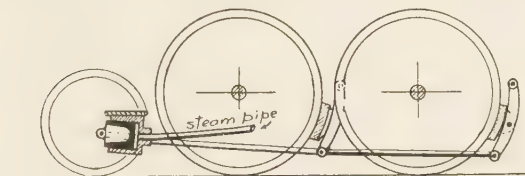
DESIGN FOR BOILER USED ON  
CAPTAIN F. C. MOORE'S  
MODEL G.N.R.  
"ATLANTIC" LOCOMOTIVE.  
(SCALE  $\frac{1}{16}$ , GAUGE  $3\frac{1}{4}$ ").

Writing about the engine, Capt. Moore says :—" I have given her 'official' trials, and as a *working* model she is about perfect ; she holds her steam to a lb. with the throttle full open and the lever right forward (or back), and has a "cut-off" as sharp as a knife. She will not work efficiently much under 50lbs. per sq. inch. and about at her best at 90lb. per sq. inch ; she will then do anything (and I should think pull a heavy load). I use the "Dalli" smokeless fuel blocks (at  $1/9$  a box of 128 blocks) ; it is made for laundry irons, but is excellent for model work, giving a great heat, with a



clear *smokeless* fire, and lasts a long time in a red-hot state. I would recommend all model engineers with internally-fired high-pressure boilers to try it.

The superstructures of the model, such as the cab, splashers and footplate, are not built up from the usual castings, but of sheet material. This of course involves much more labour, but it is rewarded in the fine finish and neater detail obtained by this method of construction.

STEAM BRAKE FOR  $3\frac{1}{4}$ "

GAUGE MODEL

ATLANTIC LOCOMOTIVE.

The engine is fitted with a steam brake, which is of special design, it being difficult to fit a steam cylinder acting in the same manner as the vacuum brake cylinder of the original locomotive. The cylinder is horizontal, and pulls directly on to the cross-rod of the brake rigging, as shown in the drawing.

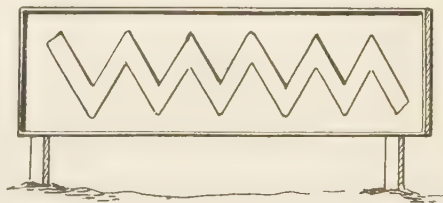
The painting of the engine is extremely good, the number being the same as the 1909 exhibition loco No. 1442.



### G.N.R. WATER TROUGHS.

Track water-pick-up troughs on the G.N.R. are laid, as mentioned in another place, at Werrington Junction, just north of Peterborough; at Muskham, north of the River Trent, beyond Newark; and immediately south of Bawtry station, between Scrooby and Bawtry. Contrary to the usual British practice, Great Northern drivers are expected to reduce speed when taking water, and the fact that these troughs are in each case situated at the bottom of long inclines in each direction—with the exception of the down line at Werrington—often renders them thus a fruitful source of delay

A WATER TROUGH MARK  
AT WERRINGTON. G.N.R.



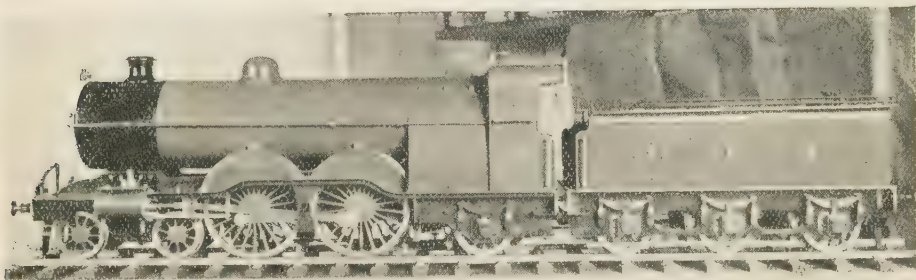
to heavy trains. The most serious case of this is at the Newark troughs, as, although the speed of trains approaching Werrington from the north is generally the higher, the severe slack shortly following at Peterborough minimises the effect of the slack over the troughs. The commencement of the trough itself is indicated to drivers by means of a large white board, about 12' long by 8' deep, standing on two uprights about 6' about ground level; a zig-zag black stripe is painted horizontally across it. This board is intended to show the exact point at which the tender scoop should be lowered.

## A MODEL $\frac{3}{4}$ " SCALE No. 251.

BY FRANK F. HOYLAND.

THE engine shewn in the accompanying photographs was built from a set of  $\frac{3}{4}$ " scale castings supplied by Messrs. Stuart Turner Ltd., of Henley-on-Thames. The G.N.R. type of "Atlantic" locomotive is well known to most readers of *Model Railways and Locomotives*, indeed it is surprising how general a favourite this class of engine has become among the ever-increasing circle of enthusiasts who delight in modelling these fine and handsome machines, which are now to be seen in profusion on the Great Northern, and in a smaller number upon the Brighton line.

As regards the material used in building the model illustrated little need be said, as the name of the firm which supplied it is sufficient guarantee that it was good, and capable of being built up into a really sound and



MR. FRANK F. HOYLAND'S MODEL G.N.R. LOCOMOTIVE, No. 251.

serviceable locomotive. The type of engine in question is perhaps not particularly easy to build, the various important parts being close, and the clearances small, which means strictness in setting out and faithful working to centre-lines: however, if time, patience, and a fair knowledge of how to go to work are available, there is not much to fear as regards a successful result.

In building this model, the drawings were of course closely followed, but many perspective sketches were made of portions before construction, to satisfy the builder that the result of the work would approximate as nearly as possible to the prototype. Also to assist in this direction, care was taken that all the metal-work exposed, and usually shewing bright, should be of iron or steel, no gunmetal being visible with the exception of the axleboxes, and the usual small brass fittings which go to make up the finish of the full-sized locomotive.

One of the difficulties that exists for the modeller of a small scale locomotive, is in the choice of the best bolts, nuts and screws, to suit this particular purpose, a proper selection of these making a very great difference for good or ill in the appearance of the model when finished. In  $\frac{3}{4}$ " scale, for instance,

it is advisable to turn down the heads of ordinary  $\frac{3}{32}$ " bolts and nuts to get the correct appearance, and the heads of screws should also be reduced to gain the same object.

As regards the number of bolts or screws to be put in for fixing any important portion of the work which is visible, there can be no question if a good appearance be aimed at, than an odd number is superior to an even one, and the trouble of adding an extra bolt over and above what may be necessary for strength is amply compensated for by the finished result.

Respecting the correct finish of a model locomotive, it appears to be almost an impossibility to paint "to scale," not only in the general coats of colour, but especially in the lining out of the various parts and panels. In the case of this model there are six coats of colour, very thinly spread, each coat when thoroughly dry being well rubbed down with fine glass paper, so that the appearance of the engine somewhat resembles the original, with the exception of the actual lining. Possibly, however, those model engineers who refrain from lining their locomotives show wisdom, for by so doing they leave something to be imagined, and at the same time are not likely to spoil the picture by "those finishing touches."



#### MY G.N.R. MODELS.

TO THE EDITORS *Model Railways and Locomotives*.

DEAR SIRS,

As requested in your June number of *Model Railways*, I enclose you herewith two photos of my  $\frac{1}{2}$ " scale  $2\frac{1}{2}$ " gauge G.N.R. locos and rolling stock,



MR. C. G. HARRISON'S MODEL G.N.R. ROLLING STOCK.



taken on a temporary line I laid last summer. I have an indoor line with three roads 60' long, but I find this much too short. I am now building a line in the garden with four roads all the way, and have the up and down main lines nearly laid. The length of line is 390' and the sharpest curve 34'



MR. C. G. HARRISON'S MODEL G.N.. TANK AND BRAKE VAN.

radius, the steepest radius being 1 in 110. If any gentleman in this district has a  $2\frac{1}{2}$ " gauge loco, and would care to bring it over, I should be very pleased to see him, and see his engine try and lower my record in speed. It may interest your readers to know that I am fitting up correct pattern G.N.R. signals with the somersault arms. Wishing your G.N.R. number every success,

Yours faithfully,  
C. GEORGE HARRISON.

THE EAST COAST ROUTE: N.B.R. LOCOS.

TO THE EDITORS *Model Railways and Locomotives*.

DEAR SIRS,

May I venture to point out one or two inaccuracies in Mr. Cecil J. Allen's admirable article in the June issue of your Magazine. In stating that the 4-4-0 type was the standard for express service on the N.B.R. for many years, Mr. Allen refers to the Stirling *regime*. Now, the N.B.R. has never at any time possessed a locomotive superintendent of the name of Stirling, Mr. Matthew Holme's immediate predecessor being Mr. Dugald Drummond, now of the L. & S.W.R., who in his turn had succeeded the late Mr. T. Wheatley—the originator of the 4-4-0 type on the N.B.R.

In writing of Mr. W. P. Reid's "Atlantics," Mr. Allen observes that they were the first Scottish locomotives to be provided with Belpaire fireboxes. I believe, however, that I am correct in saying that the first engines North of the Border so fitted were the G. & S.W.R. 4-6-0's.

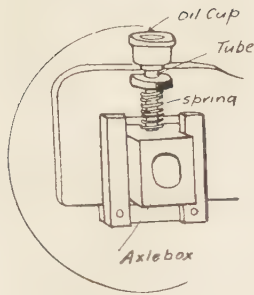
Lastly, I may say that although in his tender engines, both passenger and goods, Mr. Reid has placed the safety valves over the firebox casing, in his new tank engines, both 0-4-4 and 0-6-2, which came out in the latter half of last year, he has reverted to the practice of his predecessors, and has placed them on the dome.

Yours truly,

REPTON.

C. E. S. LITTLEJOHN.





## MODEL G.N.R. BOGIE.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I enclose a photograph of the bogie of my model G.N.R. engine, which shows the arrangement of the bogie springs. It will be noticed that the spring pins are hollow and form oil ways from the cups at the top to the axleboxes.

Yours faithfully,

MANCHESTER.

J. W. S.

[We have made a drawing, as it reproduces the idea better than the photo sent.—EDITORS.]

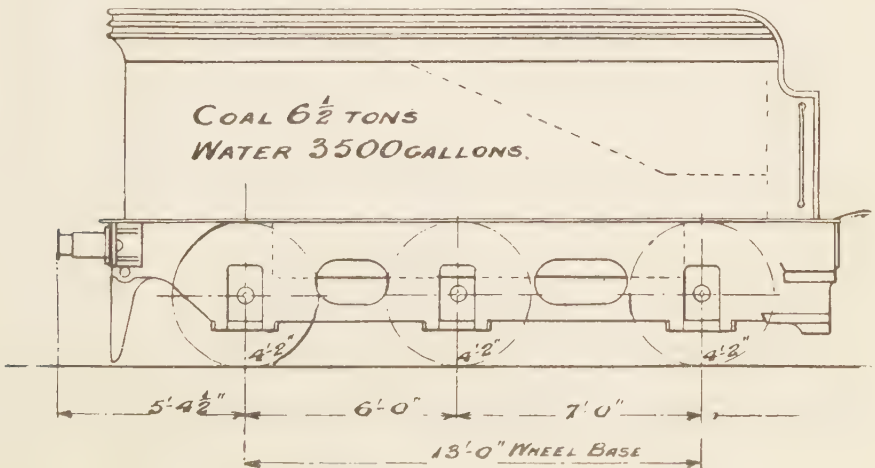
— ♦ ♦ ♦ —

### READERS IN DIFFICULTIES.

#### DIFFICULTY No. 98.—THE NEW G.N.R. TENDERS.

(St. Neots) writes:—I have noticed that the tenders of the new No. 1 class goods locomotives (those with the raised footplates) have the central pair of wheels placed farther back than is usual on the ordinary G.N.R. tenders. Can you tell me the reason of this?

We append a drawing of the new tenders, and we understand that the alteration was definitely made after a trial of a tender with the wheels differentially spaced in a



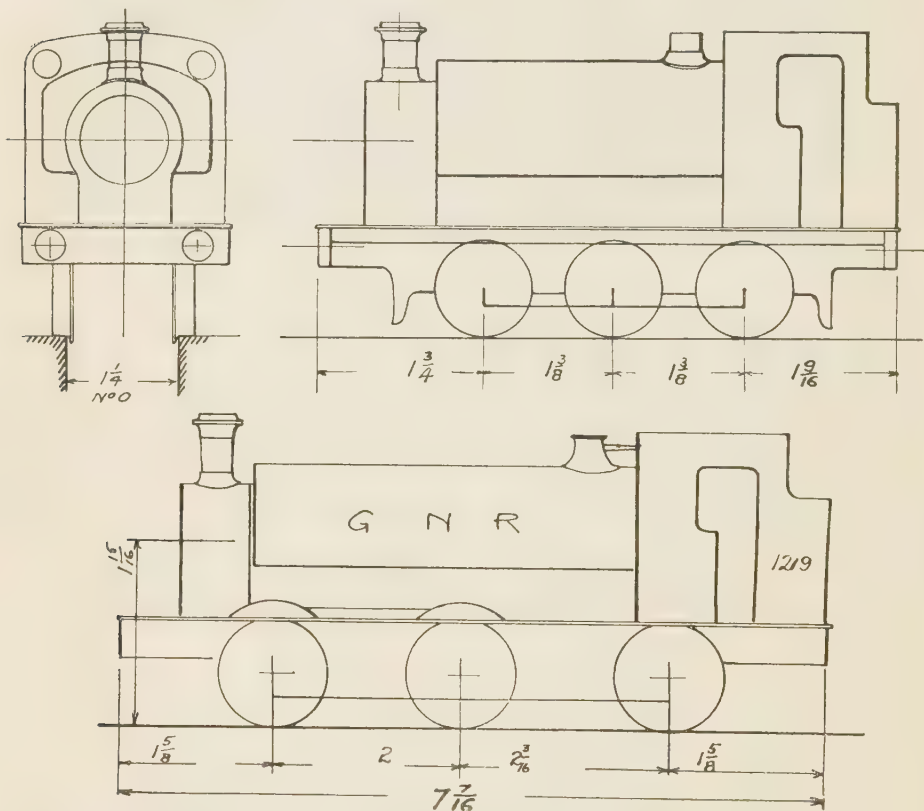
NEW STANDARD TENDER—G.N.R.

slightly lesser degree. The idea is to distribute the weight better over the six wheels. The bulk of the water is at the back of the tender and the new spacing of the wheels better prevents the back portion sagging when the vehicle has its full supply.

## DIFFICULTY NO. 101.—MODELLING A G.N.R. SADDLE TANK.

H.S.W. (Peterboro') writes:—I am about to build up a model G.N.R. clockwork driven saddle shunting engine for my line, which has 3' 0" radius curves. I am afraid that the wheelbase will be too long if the engine is modelled to scale.

We append a drawing which shows No. 1219, one of the nicest looking saddle tanks dimensioned to scale for a model No. 0 gauge engine. Yes, we are afraid you would have trouble on 3' 0" radius curves with the scale wheelbase shown in the lower drawing. We therefore recommend you to shorten the engine. Our sketch shows it reduced to the minimum length, but if you use the standard points (large radii) you will require a shorter wheelbase than otherwise necessary. However, you should have no difficulty if you make



NO. 0 GAUGE MODEL G.N.R. SADDLE TANK.

(Lower picture shows engine made to scale, and the drawing at the top how we would advise for curves of 3' or 2' 6" radius.

the wheelbase of the rear pair of coupled wheels  $1\frac{1}{2}$ " instead of  $1\frac{3}{8}$ " as marked. If the points are also 3' radius, then the wheelbase may be  $1\frac{1}{2}$ " and  $1\frac{3}{8}$ " radius respectively; for 4' radius  $1\frac{3}{4}$ " and  $1\frac{7}{8}$ " wheelbase may be adopted. The diameter of wheels is reduced to lessen the "bunched up" appearance of the wheels.

A commemoration medallion is being struck this month by *Model Railways and Locomotives*. It is intended for the watch chain, and the face side shows a G.N.R. express train, beautifully modelled in the French style. The size is  $\frac{3}{4}$ ", and the medallion can be had in bronze, gold or silver. Full particulars next month.

# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 8.

AUGUST, 1910.

## BETWEEN OURSELVES.

We are afraid that some of our readers will be writing us saying that this issue is simply the G.N.R. special number continued ; but we received so much valuable information, photographs and drawings from the company's engineer just as we were going to press with the July number that we have included it herewith. We feel sure that our readers will welcome the working drawings of the G.N.R. standard semaphore and ground signals, and the very fine pictures of the leading viaducts and bridges reproduced on pages 253 to 256. Most of these photographs were specially taken for *Model Railways*, and we have again to thank the officers of the company for the trouble they have taken in their preparation. Now then, hats off, gentlemen, please !

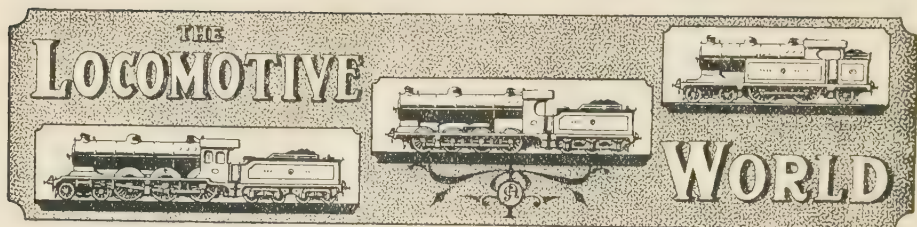
In further reference to the July special issue we have to record its great success, and we trust that the numerous new readers will continue to give us their support. We also acknowledge the many appreciative letters we have received in connection therewith. However, we are determined to do even better next time.

Messrs. Bassett-Lowke, Ltd., Northampton, have asked us to announce that they will give two prizes of goods to the value of 7/6 and 5/- for the best photographs of an outdoor 2" or 2½" gauge model railway. The photographs to be sent to the Editors, *Model Railways*, 112, High Holborn, on or before the 31st August. The successful photographs are to become the property of Messrs. Bassett-Lowke, Ltd.

We have to congratulate the advertising department of the L.N.W.R. for their new panoramic poster of the North Wales seaboard. It is very striking, and also shows the relative geographical positions of the leading places on this beautiful coast exceedingly well.

All communications as to the business of this journal should be made to *Model Railways*, 112, High Holborn, and remittance taken for subscriptions, etc., should, to save bother, be sent to that address, and not included with other orders for models or materials.

WHEN finished, it is proposed to exhibit the model 2" scale 9½" gauge G.N.R. "Atlantic" in the window of No. 112, High Holborn, London.



## THE EXPRESS LOCOMOTIVES OF THE SOUTH-EASTERN AND CHATHAM RAILWAY.

BY CECIL J. ALLEN.

THE South-Eastern and Chatham Railway boasts the somewhat unenviable distinction of possessing a system of lines over which it is probably more difficult to run trains at modern express speeds than that of any other of the great British railway companies. Both the factors of grading and of alignment of the main lines seem to combine to offer every obstacle possible to the attainment and maintenance of high speeds. Under such prohibitive running conditions the apparently somewhat mediocre schedules of the principal S.E. & C.R. express trains will be found to be considerably more creditable in actual practice than they appear on paper.

Take, for instance, the difficulties of grading. The main Cannon Street—Dover line is level out of London for 4 miles only, as far as New Cross. From this point a continuous rise of 12 miles commences, varying from 1 in 120 to 1 in 310, with 4 miles at the former figure. This constitutes an awkward start for heavily laden trains leaving London. From Knockholt summit there is a corresponding 12-mile descent to Tonbridge, with 4 miles at 1 in 143, and another 4 at 1 in 122, broken only by a brief 2-mile ascent to Sevenoaks Tunnel. From Tonbridge the line undulates, with a generally rising tendency, past Ashford, as far as Westenhanger, after which follows an absolutely unbroken 12-mile descent into Folkestone and Dover, averaging 1 in 264, and making an almost equally awkward start on the up journey.

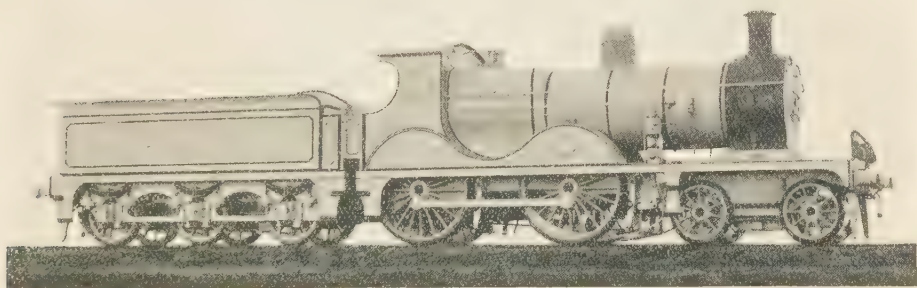
Even the stiffness of the afore-mentioned gradients, however, are nothing to those of the erstwhile London, Chatham and Dover main line, used by many of the S.E. & C. trains, especially to and from Margate and Ramsgate. From Victoria for 27 miles to Sole Street the line is a switchback of severe gradients, from 1 to 4 miles in length, and nearly all at 1 in 100. From Sole Street there is an absolutely continuous 5-mile stretch at 1 in 100 down to Strood, but this is followed by a fairly level 20-mile stretch past Chatham to Faversham. Then follows the Selling bank—4 miles up-grade at 1 in 100—110—with a subsequent 5-mile unbroken fall at 1 in 132 to Canterbury. A further 9 miles, all ascending, save for two short breaks, at 1 in 105—132, are followed by the final 7-mile drop into Dover, at the same grades.

These brief notes as to grading are necessary in order to show the class of work which the express engines of the South-Eastern & Chatham Railway are called upon to perform. When, in addition, the considerable number of points upon the main lines are remembered, where it is necessary to enforce heavy reductions of speed in order to ensure the safe and steady running of express trains, the merit of many of the timings booked on the S.E. & C.



system will be better appreciated, although, perhaps, their speed may not approach by many miles per hour those of the fastest "crack" runs of the present day.

The fastest long-distance run on the S.E. & C.R. is performed by the up Continental boat express on Sundays, which runs from Shorncliffe Camp to Cannon Street, 68 miles, in 83 minutes, an average speed of all but 50 miles per hour, which, considering the difficulties mentioned, is excellent work. The down Folkestone American Car express—4.33 p.m. ex Cannon Street—reaches Folkestone (Central), 69 miles, in 89 minutes from London daily. The majority of the boat express trains occupy 100 minutes for the 76½ miles between London and Dover. Among other long-distance runs, that of the 5.12 p.m. City fast train from St. Paul's to the Kent Coast is worthy of note; the run to Margate, 74 miles, is performed in 95 minutes. The fastest running on the system is found on the Tonbridge-Ashford length, where some very smart bookings are in force: one train covers this 26½ miles in 30 minutes,



ONE OF MR. WAINWRIGHT'S BELPAIRE EXPRESS LOCOMOTIVES.

an average of 53.0 miles per hour, while another runs from Paddock Wood to Ashford, 21¼ miles, in 24 minutes, an average of 53.1 miles per hour, and the fastest schedule on the line. Two other trains cover the latter distance in 25 minutes, an average of 51.0 miles per hour.

A further difficulty which has had to be contended with by the management has been the strength of the underline bridgework, which has precluded the placing on the line of locomotives exceeding a certain maximum weight. In view of this limitation the managing committee has wisely decided on one standard type of locomotive only for express service, representing the greatest amount of power available under these conditions. These were the first locomotives built under the superintendence of Mr. Wainwright, subsequent to the amalgamation of the South-Eastern, and London, Chatham and Dover Railways, and this type has remained the standard, with sundry insignificant modifications, from that date (1901) until the present day.

The 4-4-0 type, as that which had been in use up to that period with both the parent companies, was the one selected. The first engines of this type, built in 1901, had boilers with the ordinary pattern of smoke-box and

round-topped fire-boxes. A new series was turned out in 1906 in which, for the first time in the history of either company, the Belpaire fire-box was substituted for the round-topped type. At the close of 1907, engine No. 247 of the earlier type was fitted experimentally with an extended smoke-box of telescopic pattern, which was so successful in working that all the engines of this type built subsequently have been similarly equipped. The latest locomotives, therefore, have both Belpaire fire-boxes and extended smoke-boxes, and one of this type (No. 516) will be familiar to our readers as having been exhibited at the Franco-British Exhibition of 1908. This engine is intended particularly for the working of Royal Special trains.

Despite the small modifications in the design mentioned, the general details and dimensions of all these express locomotives are almost exactly similar. The cylinders are 19" diameter by 26" stroke, except in the latest batch, in which the diameter has been increased to 19 $\frac{1}{4}$ ". The bogie wheels are 3' 7" in diameter, and the driving wheels, without tyres, 6' 6". The bogie wheel-base is 6' 3", the coupled wheelbase 9' 0", and the total wheelbase of engine 22' 11 $\frac{1}{2}$ ". The boiler, of which the barrel is 11' 1" long by 4' 9" in diameter, is pitched with its centre-line 8' 0" above rail-level, and is pressed to 180lbs. per sq. inch. The ordinary boilers have a heating surface of 1,505 sq. feet, with a grate area of 20.3 sq. feet, but in those fitted with Belpaire fire-boxes these figures are increased to 1,532 sq. feet and 21.15 sq. feet respectively. The total weight of the engine is one of 51 tons, of which 34 tons are available for adhesion.

The tender is mounted on six wheels, each 4' 0" in diameter, and carries 4 $\frac{1}{2}$  tons of coal, with 3,300 gallons of water. In working order the tender weighs 41 tons, so that engine and tender together weigh in all 92 tons when fully loaded. The total wheelbase of engine and tender is one of 45' 1 $\frac{3}{4}$ " and the total length over buffers one of 55' 1 $\frac{3}{4}$ ".

For artistic finish the South-Eastern & Chatham locomotive is probably without a rival, the aesthetic blend of colours in the painting and lining being one especially pleasing to the eye. Coupled with the copper chimney cap, the brass dome and safety-valve columns, beading round the splashers and smokebox, etc., these engines present the very picture of smartness. The general lines of construction of the earlier engines of the class also were exceptionally graceful, and although the Belpaire fire-box, the extended smoke-box, the four front cab windows, the new pattern of splashers, and the chimney *capuchon* or wind deflector, have somewhat detracted from their appearance, they still rank as very handsome locomotives. Their meritorious performances on the road, also, testify to the truth of the old adage, that "handsome is as handsome does."

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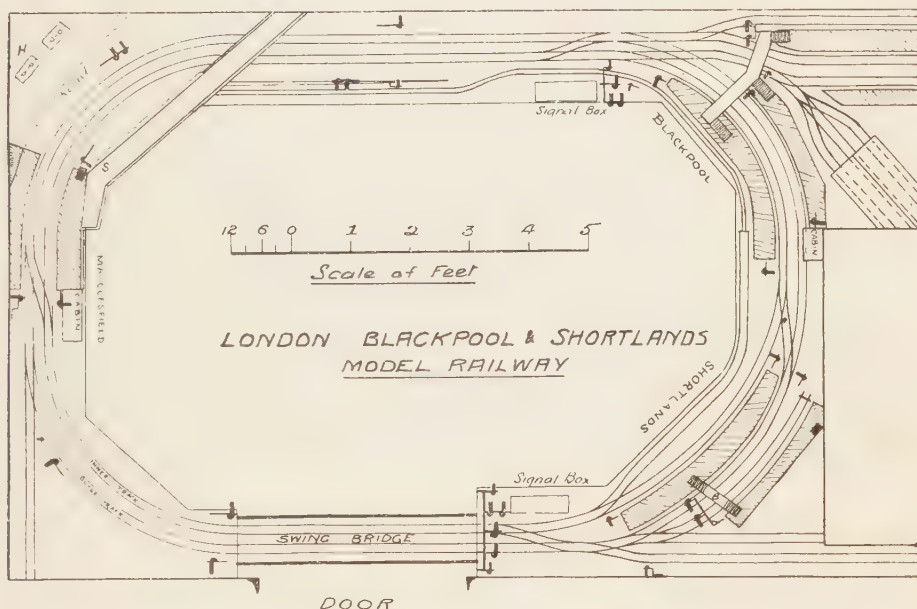
### HOW TO SEE THE G.N.R. CHEAPLY.

THOSE railway enthusiasts who favour the G.N.R., and whose business does not take them travelling on this line very much, cannot do better than take one of the East Coast half-day runs to Skegness and the district. The fare is only 3/-, and the best of rolling stock and locomotives are employed on these trains. We made a trip—not to see the sea—last year, and can speak very highly of the arrangements made by this company and the speed of the trains.

## THE LONDON, BLACKPOOL AND SHORTLANDS MODEL RAILWAY.

BY L. H. A. CARR.

THIS railway may be said historically to have consisted of three systems. System I. was a "narrow-gauge" line (1 $\frac{1}{4}$ " ) which existed from the beginning to the end of 1901. At the end of that year it was decided to go in for a larger size model, so all the old stock was sold off, and system II. commenced, of 1 $\frac{3}{4}$ " gauge. This was laid, as was the narrow gauge line, in a U form on the floor, the stations and curves being built up on 4' boards, and most of the straight being loose rails on tin sleepers. There were three stations—



Blackpool, Macclesfield, and Shortlands, (the London terminus), though these stations were never finished far enough to have platforms. The track measured 45 feet from end to end. By the time that a double line was made right through, together with a sufficiency of sidings and crossovers, the labour in erecting it and putting it away (which had to be done every night after running) became a serious difficulty, it taking just about an hour to set up.

System III. was then commenced in November, 1903. In this system a shelf, normally 12" wide, was laid all round a room specially devoted to that purpose, with a hinged flap or "swingbridge" past the door. At first the system had two termini as before, but first one, and then two "through," connecting lines were laid, so that eventually the railway became an oval-shaped system, with three stations—Shortlands, Macclesfield, and Blackpool.

Though the track on this system is shorter than before, 37 feet on the "outer through" and 34 feet on the "inner through," yet this system is a considerable improvement on the last, as the railway is always ready for running by merely closing the "swingbridge." Also many of the fittings, bridges, platforms, etc., would entail prohibitive labour if they had to be set out each time. Much of the present system, including several pairs of points, crossovers, three signalboxes and many signals, were transported bodily from the small boards on which they were placed in system II., while about half the present rolling stock dates back to that period. It is this system (III.) that is described in this article. System IV. has recently been started, as the railway has been removed to another house, so that system III. is now no more.

To pass now to the railway itself, 1 $\frac{3}{4}$ " gauge as stated. The rolling stock consists of the vehicles next described. (It should be noted in passing that the numbers have been carried on consecutively from the narrow-gauge system, so that there is now no No. 1 on the railway.) There are three sets of numbers used, one for locomotive stock, the second for passenger, and the third for goods stock. Besides this, vehicles manufactured by the L.B. & S.R. have a "works number" painted on the underside of the vehicle.

List of rolling stock :—

One steam locomotive (type 2-2-0, outside cylinders) No. 5 "Charles Dickens," bought at Christmas, 1901, from Messrs. Wiles, Manchester. This loco is still running, and appears to have a useful life yet in front of it. As might be expected, it now runs much better and more sweetly than when it was new. It will now take up to nine vehicles for a short time on the oval track illustrated, and would do better on a straight run.

One clockwork locomotive (0-4-0) "Castlerae" No. 6, bought Christmas, 1902; since fitted with electric headlight (battery in the tender).

One clockwork locomotive (4-4-0) No. 8 "Jeanie Deans," bought June, 1906, from Messrs. Bassett-Lowke. This was originally of the 2-4-0 "Charles Dickens" type, but was fitted with a leading bogie by the L.B. & S.R. instead of the pony truck, which was found to be a frequent cause of derailment.

No. 7 has been vacant for an electric loco, which was built experimentally some years back, but nothing has yet come of it, though electrification of the line is now probably only a matter of time.

The passenger stock consists of six carriages and one guard's van (bought out at various times). These have all been repainted the standard colours of the L.B. & S.R. Co., viz., royal blue and white, picked out with gold, and lettered in white. Besides this is one bogie corridor carriage (five compartments and two lavatories), built by the L.B. & S.R. Co.

The goods stock consists of—

Ten four-wheeled open trucks (four bought, six made by the Ry. Co.).

Two four-wheeled "narrow gauge" (1 $\frac{1}{4}$ " ) trucks, made by the Co.

One bogie truck, made by the Co.

One crane and safety wagon, made by the Co.

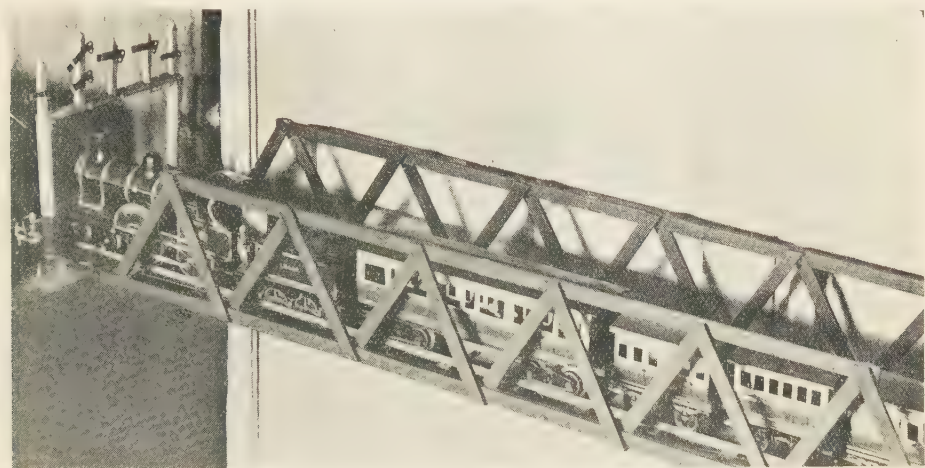
One van, one salt wagon, three wood cars, one horse-box (all bought).

Most of this bought stock was obtained from Messrs. Bassett-Lowke, and is of the *old* type, *i.e.*, long before the days of the small standard vehicles now put forward by that firm. The open trucks are all painted a light green, and lettered white.



The two narrow gauge trucks are for through communication with the Kenley and South Windsor Railway, a  $1\frac{1}{4}$ " system *actually* situated about two miles away, but *theoretically* connected by a tunnel with the L.B. & S.R., a  $1\frac{1}{4}$ " line running into Blackpool station.

The large bogie truck is fitted with a piece of  $1\frac{1}{4}$ " track, so that these two vehicles may be run straight on to it, by a special bay, avoiding the necessity of transshipping goods from one system to the other. For this purpose the ends of the truck are obviously removable. The piece of track on the floor can easily be taken out, so that the truck can be used for ordinary purposes. The vehicles are all fitted with curved central buffer (as illustrated), with hook and chain coupling, the original side buffers having been removed from the bought vehicles, with the exception of loco No. 6, the side buffers of which screw in, and fix the central buffer. With these buffers the locking problem is solved, and though on paper they appear large, yet in practice, when enamelled black, they do not look at all out of place. With regard to



MR. CARR'S MODEL GIRDER LIFTING BRIDGE AT DOORWAY.

the vehicles built by the L. B. & S. R. Co., it should be stated that the wheels and axles have in each case been bought, but the rest of the vehicles are of home manufacture.

There are three stations, as follows :—Shortlands station has an island platform for the through traffic and one bay (platform No. 3), the platforms being joined by the footbridge. Macclesfield has two platforms, one for each through line, a subway and a road overbridge connecting the two. Between Macclesfield and Blackpool, the Kenley Joint line rises out of its tunnel, and runs alongside the main track to Blackpool station, which has five platform faces, No. 1 for the narrow gauge, Nos. 2 and 3 for through traffic, and Nos. 4 and 5 terminal lines. Besides this there is a short bay which is rarely used, being the remnant of a platform in use before the siding was run to the engine shed.

The track is built of loose tin-plate rails mounted on wooden sleepers (cut from blind laths) with small tacks. There are a few sections, however, principally sidings, with tin sleepers. The points are all manufactured by

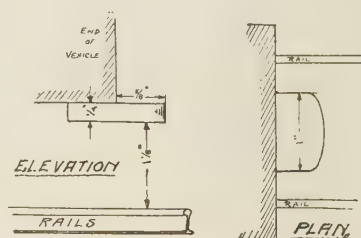
the L.B. & S.R. Co.; in fact, it is the proud boast of the "chief engineer" that the company has never yet bought a pair of points. The earlier point blades were made from sheet zinc, but all new ones are made from tin rail cut down. The zinc blades, when well made, are quite satisfactory, however, Shortlands crossover (of this type) has been working since 1901 (being bodily removed on to system III). The railway is controlled by four signalboxes, as under :—

| Box.          |    | Total<br>Levers. | Levers<br>in use. | Cross-<br>overs. | Single<br>Points. | Signals. |
|---------------|----|------------------|-------------------|------------------|-------------------|----------|
| Shortlands    | .. | 18               | 16                | 1                | 4                 | 11*      |
| Macclesfield  | .. | 16               | 10                | 1                | 1                 | 8*       |
| Blackpool     | .. | 20               | 18                | 1                | 4                 | 13       |
| Intermediate  | .. | 8                | 7                 | 1                | ..                | 6        |
| Ground levers | .. | 2                | 2                 | ..               | 2                 | ..       |
| Total         | .. | 64               | 53                | 4                | 11                | 37*      |

\* Note one signal "slotted" from Shortlands and Macclesfield.

The signal boxes are all home-made, the levers, floors, catches, etc., being made of stout sheet zinc. Those boxes which are finished and have roofs fitted have removable backs for operating purposes. The points are worked

# MR. CARR'S MODEL RAILWAY : CENTRAL BUFFER FOR ROLLING STOCK.



by rods of copper wire with zinc angle plates, while the signals are worked by thread, with the usual counterweights. The signal-arms are of zinc on wooden posts. The whole of the signals and signalling apparatus has been made by the L.B. & S.R. Co.

The signals, cabins, platforms, etc., are all painted, as will be seen from the photographs, and the line is backed up with grass-green crêpe paper tacked to the walls.

The finish of the railway is added to by advertisements, name boards, "way out" and "cross the line" notices, etc., while the line is staffed by model soldiers, porters and passengers, including the ubiquitous "lady in red" who now seems to appear on most small scale model railways.

In conclusion, it may be stated that the L.B. & S.R. is being rebuilt in another home, trains in fact already running on the through lines. Owing to the shape of the room, however, Blackpool station will have to be largely rebuilt, but as it will be possible to let an extra eight feet of straight into each of the long sides of the oval, it is hoped that the line will ultimately not only regain its former state, but considerably surpass it.

## THE ENGINEERING FEATURES OF THE GREAT NORTHERN RAILWAY.

BY CECIL J. ALLEN.

*(Continued from page 204 of Special G.N.R. Number.)*

NEEDLESS to say, the uniform grading of the main line has called for some heavy engineering work, especially in the hilly country immediately north of London. The casual observer cannot fail to be struck with the constant succession of tunnels when leaving London, there being two between King's Cross and Finsbury Park, five between Wood Green and Potter's Bar, and two more north of Welwyn, a total of nine in 23 miles. Of these the longest is that immediately south of Potter's Bar station, which is 1,214 yards in length. The first two tunnels out of London are arranged for six



WELWYN VIADUCT, G.N.R.

roads in three pairs, up and down, and the second two tunnels for four roads, but all the tunnels north of New Barnet are built for the double main line only. In the case of the tunnels between Wood Green and New Barnet the original centre tunnel for the main line still exists, flanked on either side by a single tunnel for the up and down local roads, making three parallel "bores" in all. Beyond these already mentioned there are only three more very brief tunnels on the main line—Stoke summit, Peascliffe, beyond Grantham, and Askham summit. The longest tunnel on the system is at Queensbury, near Bradford, which is 2,501 yards in length, while there are four further tunnels, Leesmoor, Mapperley and Clayton, which also exceed 1,000 yards.

By far the most remarkable engineering work in the neighbourhood of London, however, is the Welwyn Viaduct, which spans the valley of the Maran, a tributary of the Lea. This immense structure is 1,560 feet long and 100 feet above the ground at its highest point. It has forty semi-circular brick arches, each of 30 feet span. The enormous expense in widening this viaduct, in addition to the five tunnels at present only double line, has been



the principal factor inducing the construction of the new loop line from Enfield to Stevenage, via Cuffley and Hertford, which will, when completed, form a relief to the main line. This will, of course, tap new districts, while it has also involved the construction of several fair-sized viaducts, as well as a tunnel, 2,160 yards long, which has yet to be bored, but even then the expense will be considerably less than that of widening the main line for this length. The relative position of the new line is shown on the large plan reproduced in our last issue.

The first section of this line, from Enfield to Cuffley, was opened on April 4th of this year, and work will shortly be proceeding on the remainder. On the section now in use, no less than a million cubic yards of earth were



ILKESTON VIADUCT, G.N.R.

excavated; this quantity was rendered larger than it might otherwise have been by the fact that much of the soil encountered was clay, rendering 3 to 1 slopes for cuttings necessary in order to avoid the possibility of "slips." Of the two largest viaducts, that at Rendlesham, spanning a valley  $66\frac{2}{3}$  feet below rail-level, is 495 feet long, and has fourteen segmental arches of 30 feet span, while the Soper's Farm viaduct has eleven segmental arches of the same span, being 390 feet long, and  $54\frac{2}{3}$  feet above ground level at its highest points. This viaduct is exceedingly well proportioned and will appeal to the makers of models.

Beyond the tunnel already mentioned and another short one of 338 yards, near Hertford, there will be no other further engineering works of note on the new line. The ruling gradient, as on the main line, has been made approximately to 1 in 200.

Once well out of London, the engineering work met with on the main



line is not exceptionally heavy, but three underline girder bridges, spanning respectively the Great Eastern Railway at Peterborough, the River Trent at Newark, and the River Don at Doncaster are noteworthy. Each of the three is a renewal of an older structure—carried out without interference to traffic, and is built of steel on the Whipple Murphy truss principle. The Peterborough bridge has a square span of 83 feet—109' 7" on the skew—and the Don bridge one of 185 feet, these two being dated 1896 and 1894 respectively. The most remarkable of the three, however, is the Newark Dyke bridge, which has a clear span of no less than 262' 6". It was built in 1894, replacing an old Warren truss, and is among the largest single-span girder bridges of its type in the country. This bridge would probably have attracted considerable notice in the country at the time of its construction, had it not been to some extent overshadowed by the Forth Bridge, which was building at the same time. Generally speaking, brickwork was more



GIRDER BRIDGE, NEWARK DYKE, G.N.R.

in favour during the construction of the G.N.R. than metal, and most of both the over-line and under-line bridges are brick structures of three or four spans.

Some of the finest engineering work on the Great Northern system, however, occurs on the Nottingham and Derby section, which, on account of its cross-country character, involved heavy engineering. Near Kimberley there is an extensive cutting through hard magnesian limestone, 1 $\frac{3}{4}$  miles long, and 55 feet deep. The Erewash Valley and the Midland Railway are crossed by one of the largest lattice-work viaducts in the country, of which not only the main girders are of the lattice pattern, but also the trestle piers. This viaduct is 1,449 feet long, with a maximum height above ground of 63 feet; it has sixteen 77 feet lattice-girder spans, and also three small plate-girder spans. It is constructed entirely of wrought iron, and was completed in 1878. One of the greatest difficulties encountered in its construction was that the ground was honeycombed with old coal workings, making the arrangement of suitable foundations a serious matter.

Another large viaduct spans several streets and a stream at Derby, and also occasioned some difficulty in construction by being designed on the curve. It has twenty brick arches with spans varying from 21 feet to 40 feet, and three wrought iron plate-girders, with spans varying from 38 feet to 42 feet. It is 924 feet in length, with a maximum height of 19 feet above ground level, and was also built in 1878.



THE NEW RADCLIFFE VIADUCT, G.N.R., DURING CONSTRUCTION.

(This picture shows the brick arches being built under the old wood trestle construction.)



SOPER'S VIADUCT, G.N.R.

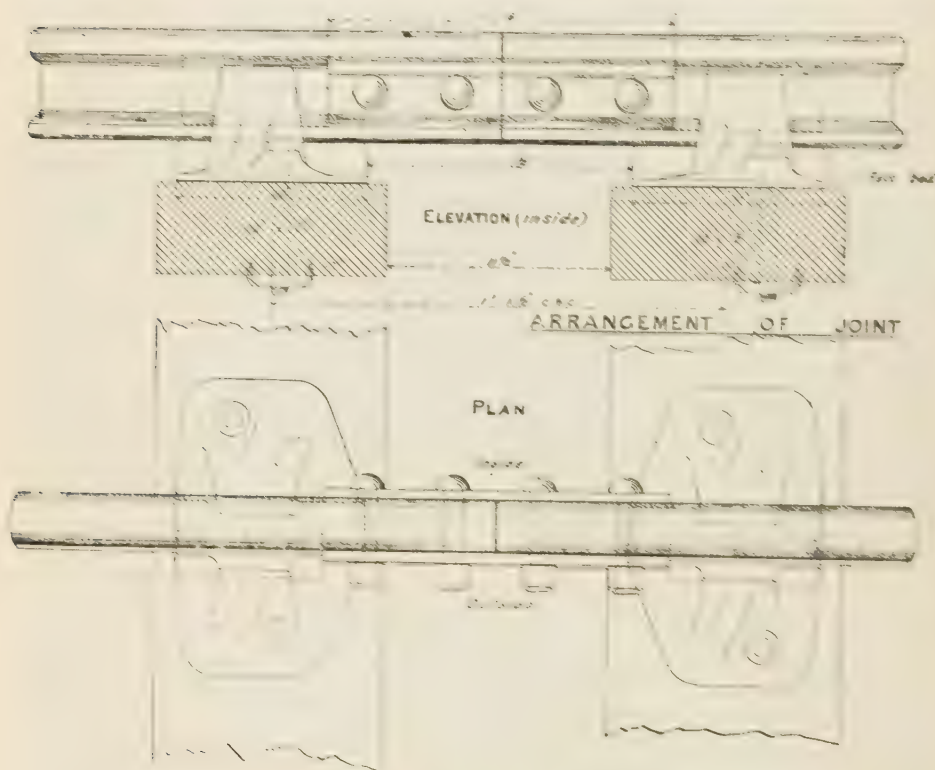
Several extensive bridge reconstructions are now in hand. One of the most ticklish of these is that of the viaduct over the River Trent at Radcliffe, near Nottingham. The superstructure of this viaduct originally consisted of thirty-two timber spans, but these are now being rebuilt as twenty-eight brick arches. The care required in this work will be appreciated when it is remembered that the brickwork is being built absolutely in position under the line, without any disturbance to traffic. Another timber bridge to be replaced is the South Forty-Foot Bridge at Boston, Lincolnshire, which





certain buildings on the platform in order to make room for the stairs to the new subway.

A brief reference to permanent way is necessary before concluding the present article. The 7-lb. rails with which the G. N. R. was laid on construction, with a view to the heavy mineral traffic that it was proposed to carry, have, of course, long been out-of-date, although they were considered at the time to be a positively extravagant expenditure. The modern main line is laid with rails weighing 100lbs. to the yard, in 45-foot lengths; the old standard length was 30-feet, and considerable distances of line were laid also with 30-foot rails before the present standard length was adopted. The



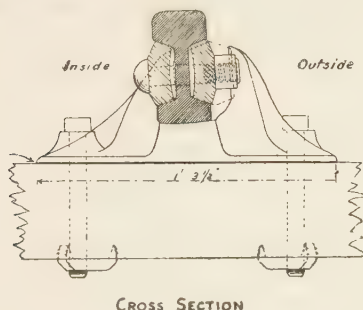
STANDARD FISHPLATE JOINT USED BY G.N. RAILWAY COMPANY.

(Note the extra large chairs used on each side of joint.)

100lb. rails are laid in cast-iron chairs weighing 53lbs. each, on sleepers 9' long by 10' wide by 5' deep. On each side of the rail joint the base of the chairs is enlarged (increasing the weight by about 7lbs.) and the width of the sleeper is increased to 12". By this means the clear span between the chairs is reduced to 13½" at the rail ends—or 10" less than at the intermediate part, making a more efficient support for the joint. Eighteen sleepers are arranged to one 45' length of track. The ballast used is generally broken granite, or granite "chippings," although gravel is used at points where it is readily



available. In certain districts where there are four tracks, the centre pair, or the main line, are ballasted with granite, and the outside or relief lines with gravel, the combination giving an extremely neat appearance to the road.



CROSS SECTION OF  
STANDARD G.N.R.  
RAIL JOINT.

In conclusion, I have to express my thanks to Mr. A. Ross, the chief engineer of the Great Northern Railway, for his kindness in supplying the data of the accompanying article, together with the drawings and photographs, the latter having been specially taken for the purpose of its illustration

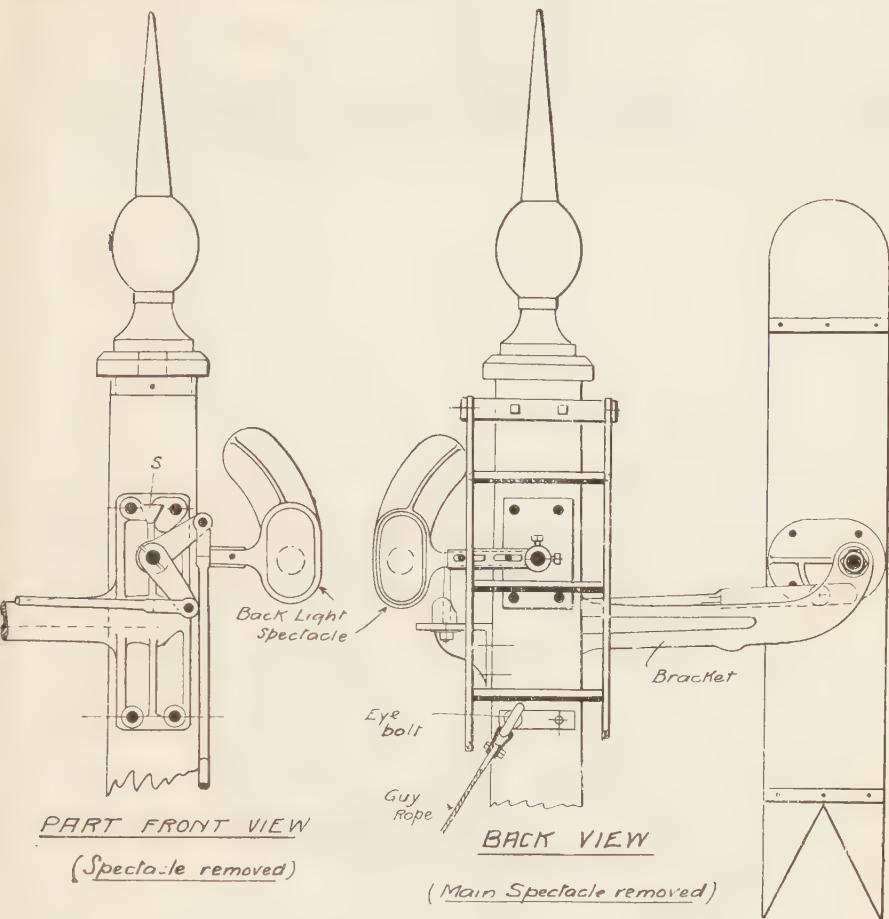


INTERESTING locomotive trials took place recently on the Highland Railway, between Blair-Atholl and Dalwhinnie, with the view of testing the respective powers of the heavy engines of the North British and the Highland Companies. The locomotives concerned were the North British engine No. 867 and the Highland Railway engine No. 146. Each is of about 100 tons, and was attached to a train made up of eight dual fitted bogie carriages, with saloon and brake-van. The distance traversed was 23 miles, part of which rises 1' in 75', while the line itself reaches the highest altitude of any in Britain, being nearly 1,500 feet above sea-level at the county march. A number of directors and officials of both companies observed the performances of their respective engines, and as the result of the trial it is understood that the North British locomotive did the distance in 40½ minutes (2½ minutes less than schedule time), while the Highland took 44 minutes. It is understood also that on a similar trial on the level between Perth and Kinross the North British engine had slightly the better time.



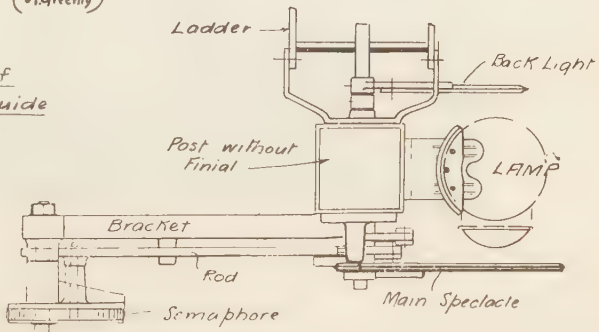
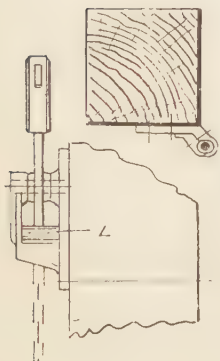
THE Pennsylvania Railway is now using signal instruction cars on all divisions. The new cars in use on the main line are 60' long, divided into two compartments. One room will be used for examinations, while the other will contain a table upon which is to be placed under a glass cover a large track chart of the railway, which can be rolled back and forth by means of rollers placed at each end. This chart shows all main running tracks, switches and cross-overs, all signals, track troughs, stations and mileposts. The men will be given an opportunity to study this chart prior to passing an examination on it. Each car is provided with a set of model signals, which can be manipulated so as to show all signal indications. The cars are in charge of examiners, each of whom has an assistant. These men will have charge of all examinations, except those on machinery and air brakes. The cars will also be used for examination of employes on train rules and other subjects.—*Engineer.*





(H. Greenly)

Plan of  
Rod Guide





## II. GREAT NORTHERN RAILWAY SIGNALS.

*(Continued from page 205.)*

As regards visibility, the Great Northern gives about the most unmistakable indication of "line clear" of any type of signal now in use in this country, while the ease of balancing the arm and the impossibility of a fall of snow upsetting the balance, make this signal very reliable for general use.

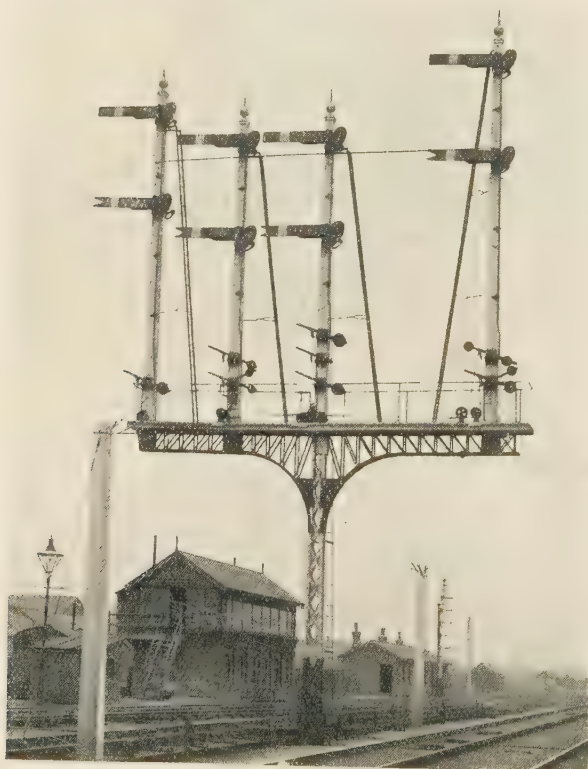
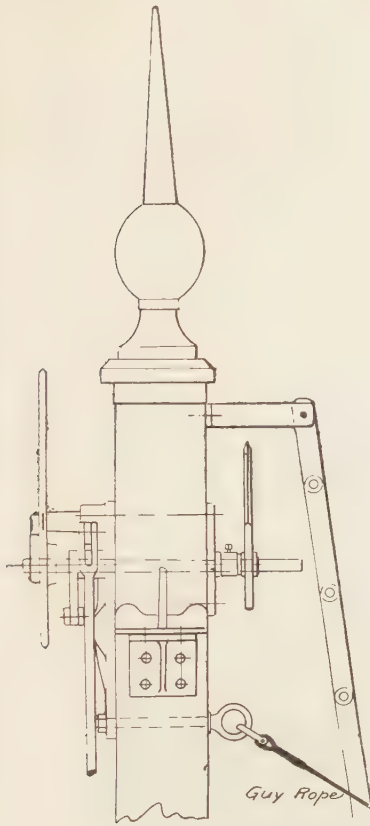


FIG. 2.—G.N.R. BRACKET SIGNAL: DECOY NO. 1 BOX.

*(This photograph shows a large bracket signal in which the home signals are worked from one box and the distants from another.)*

The more complicated form of construction and the extra expense involved have, however, prevented the "somersault" signal coming into general use in this country, only two other comparatively small lines—the Taff Vale and the erstwhile Lancashire, Derbyshire and East Coast (now Great Central) having adopted it as standard.





SIDE VIEW

Fig. 3.

"danger" position (red glass opposite lens), and no farther.

The limits of the movement of the arm are governed by the bottom counterweight lever bracket. This bracket is of the forked type, and is provided with loose strips of metal (L, L), the thickness of which may be adjusted to prevent, on the one hand, the signal-man pulling the signal past the vertical or "off" position, or on the other hand, the counterweight from causing the tip of the signal arm to incline upwards when in the "danger" position.

The arm which carries the small back light spectacle is fixed to the projection of the pivot spindle at the back of the post.

The drawing on page 261 shows the position of the ladder, which is omitted from the two front views. The top of the latter is fixed to a U-shaped bracket bolted in a horizontal position to the top of the post just below the finial. This drawing

Our centre plate in this issue, the particulars for the preparation of which we are indebted to the G.N.R. Company's engineer, gives a better idea of the construction of a G.N.R. signal than the simple diagram we reproduced in the previous article, and also shows the position of the lamp and spectacle.

The arm itself is of tapering thickness, thinnest at the tip, and the back end is rounded as shown. Although the pivot is exactly in the centre longitudinally, it is set towards the top edge so that should anything break, the tendency of the arm will be to fall into a horizontal or "danger" position.

The arm is bolted to an oval casting at the back and a thin plate at the front, the casting being pivoted to the bracket, and also provided with an attachment for the horizontal pull-rod.

It will also be noticed that a lug is cast on the bracket at A, the use of which is, we presume, to support the pull rod should the latter break or become detached from the bell-crank. Its weight will under such circumstances not interfere with the swinging of the arm back to the desired "danger" position. The main spectacle is attached to one of the arms of the bell-crank fixed to the pivot pin which passes through the centre of the post. A stop (S) is cast on the sole of bracket to prevent the spectacle falling right down, so that the red glass is clear of the lens of the lamp. Under this arrangement should the set screw which fixes the spectacle to the pivot spindle become loose, the spectacle falls immediately to

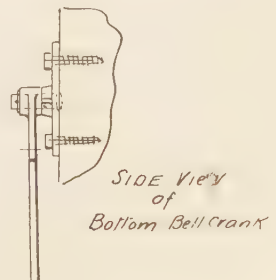


Fig. 4.

also shows the top fixing for the guy ropes. This attachment, however, is varied according to the special requirements of the site.

The rod between the top bell crank and the counterweight lever is made capable of adjustment by means of the long screwed portion which fits the fork of the bottom joint. The lever is attached by a chain to the bell crank the bracket for which is affixed on one side of the post or the other, according to the relative position of the signal to the cabin, and other "local" conditions. The drawings show the attachments, and are all reproduced to a scale of  $\frac{1}{16}$ th full size, so that they are useful, without further alteration, for a  $3\frac{1}{4}$ " or  $3\frac{1}{2}$ " gauge model railway.

The finial is a casting, and fits over the top of the post, which is shouldered down for  $1\frac{1}{2}$ " of its depth to receive it.



FIG. 5.—PHOTOGRAPH OF THE EXTERIOR OF A STANDARD G.N.R. TIMBER SIGNALBOX AT "LOVERSALL CARR."

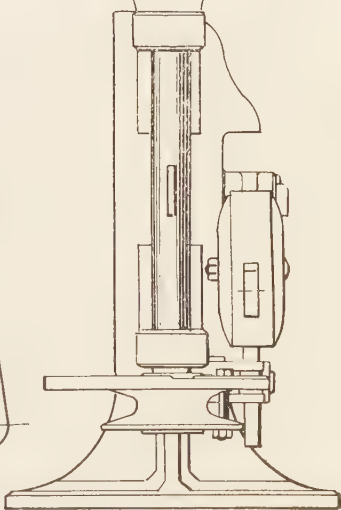
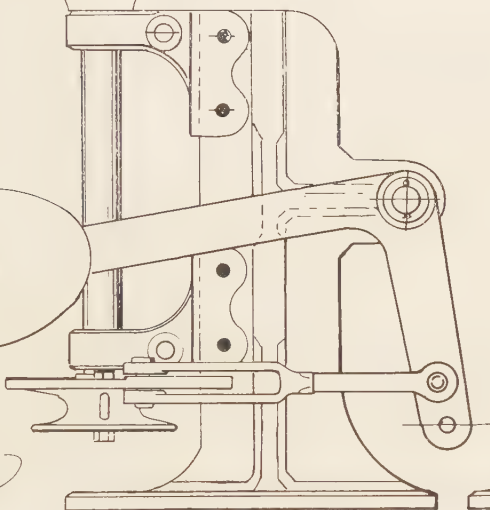
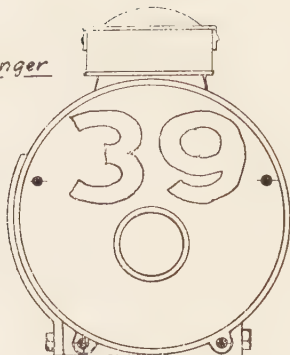
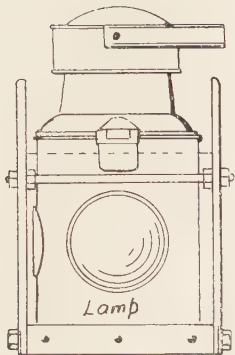
Our drawing Fig. 6 shows the G.N. Railway standard rotating ground-disc, which is generally used for shunting purposes. It is, as will be seen of novel yet simple design, and is worthy of special comment. It is, in the first place, arranged for a removable lamp, and has the danger side painted red, and a raised number cast on it which is picked out with white. The lamp itself provides for the "alright" signal, and this lamp is made with two such lenses so that it may fit a right or left-handed signal. No discrimination is then required by the lamp-room porter in placing the lamps in position at the close of the day. In some cases we have noticed that a white back-light is shown in the danger position, but no such arrangement is shown on the standard drawing.

The disc is made to rotate by means of a wire which is connected to a short chain fastened to a pulley at the bottom of the vertical spindle. The counterweight and its levers are simply used to bring the signal back to the "danger" when the tension of the wire is released.

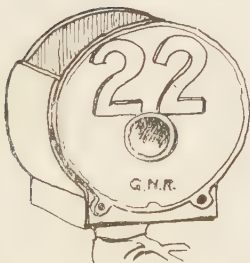
Alright

Danger

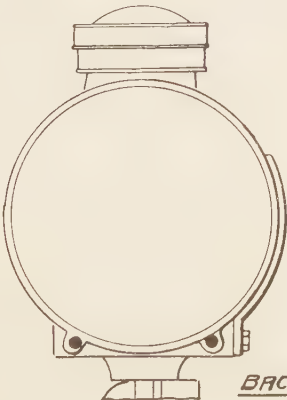
Scale  $\frac{1}{2}$ "  
to one foot



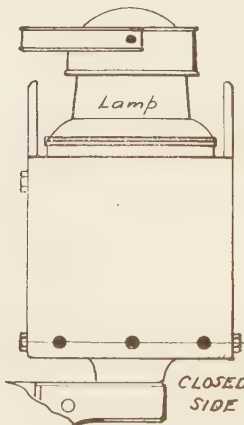
*22/10/1910*



SKETCH OF HEAD  
WITHOUT LAMP



BACK

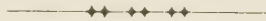


CLOSED  
SIDE

GREAT NORTHERN RAILWAY STANDARD GROUND DISC SIGNAL.

Fig. 5 shows a standard signal cabin, which, while having no features specially worthy of note, is nevertheless distinctive. The more important cabins are built of brick, while those in country districts are generally constructed of timber. The size of the box, or, rather, its length is regulated by the size of the locking-frame, the usual custom being to leave 5' 0" clear between the end of the frame and the side of the box. The instrument-table is sometimes placed at the back and not over the levers. Among the chief external characteristics of the G.N. signal-box may be mentioned the neat little closet arranged outside the box, at the top of the stairs, the large projecting gable at either end of the box, and the very large amount of glazing, the three sides of the cabin, as seen from inside, being practically all glass. Contrary to the usual custom, the name-board is not carried on the front of the cabin, but on boards placed at either end, in such a way as to be much more easily visible from passing trains. In the older cabins the board was placed below the windows, but in the more recent erections the board is carried in a commanding position above the windows.

I am greatly indebted to Mr. Ross, the chief engineer of the G.N.R., for kindly supplying the drawings of the signal and ground-discs herewith reproduced, together with the interesting photographs herewith reproduced of signalling installations on the G.N.R.



### **L.B.S.C.R. HEADLIGHTS.**

It is stated in the *Railway Club Journal* that the London, Brighton and South Coast Railway has just made a much-needed and important change in the head codes used for denoting the destination of trains. Hitherto these have comprised plain white discs, white disc with green or black centres, white with a black cross, white with black horizontal lines, and the "special train" board—two black diamonds side by side on a white ground. Distinctive as these may have been in the daytime, they were utterly useless at night, for all varying signs had perforce to be shown by combinations of white and green lights. Henceforward a white disc by day will represent a white light at night, and a white disc with a black cross will be the sign for a green light at night. Thus the day and night codes will synchronise, but even now the plan does not seem equal to that employed by the Great Eastern, where the green light is indicated in the day code by a green disc with a white rim. The change will prove welcome to travellers on the London, Brighton and South Coast Railway, as well as to the staff, for the code hitherto in use was probably the most complex and unsatisfactory that could be found on any line.



### **GENERAL MANAGER, CALEDONIAN RAILWAY.**

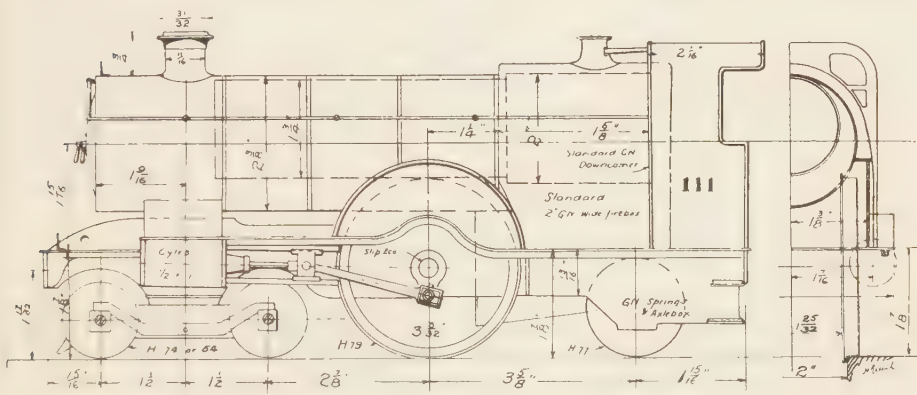
Mr. Guy Calthorpe, general manager of the Caledonian Railway, has tendered his resignation on his appointment to a similar post on the Buenos Ayres and Pacific Railway. The change, it is stated, will take effect in three months' time. Mr. Calthorpe was formerly in the service of the London and North-Western Railway at Euston.



## TWO MODELS OF IMPROBABLE G.N.R. LOCOMOTIVES.

BY H. GREENLY.

A READER of *Model Railways*, whose indoor 2" gauge line has locomotives and carriages of G.N.R. design, desiring not only to increase his locomotive stock, but to obtain some variety in design, empowered the writer to prepare sketches for two engines, one for fast light passenger trains, and the other for what is sometimes called "mixed" traffic, both of which should be capable of traversing the rather sharp curves (7' 6" radius) which are necessary by



A DESIGN FOR A MODEL SINGLE LOCOMOTIVE WITH WIDE FIREBOX,  
BASED ON G.N.R. PRACTICE.

the limitations of the situation of the railway. One engine was to be a single and the other a 4-6-0 type. The sketches herewith are the outcome of this command, and suggest possible, but improbable, Great Northern Railway locomotives.

The external arrangement of the single engine is based on the "Stirling 8-footers," the driving wheels, however, being somewhat smaller. Outside bearings to the trailing wheels are also employed as in the latest single express locos of the G.N.R.

The chief feature of the model is the boiler. It would have been of little use to have fitted a boiler of the same outside dimensions as the standard "8-footers" to so small a working model. The water and steam capacity would have been insufficient to ensure a successful engine, and therefore a boiler of the same outside size would be fitted to a model four-coupled engine like the "Precursor" (L.N.W.R.) is provided, and to increase the capacity the firebox is the same as employed in standard model 2" gauge G.N.R. locomotive we illustrated in our issue of March, 1909, last, the downcomer and cab front plate being a single casting. The barrel of the boiler, it will be noticed, is in two parts, the rear section being made to suit the standard downcomer casting and the forward portion small enough to give ample space for the water-tubes and for the heated gases passing to the chimney. The



The arrangement of coupling and connecting rods is worthy of mention in that it provides for side and vertical play in the rear coupled wheel, and also brings the connecting-rod and cylinder centres well clear of the forward crank-pin and the trailing bogie wheels.

The outer shell of the boiler being 3" diameter, a  $2\frac{1}{4}$ " inner boiler may be employed, but of course a spinal downcomer must be made to suit the engine.

The tender is not in accordance with Great Northern practice, but is more like those fitted to some L.S.W.R. engines. It carries both water and



FIG. 3.—COUPLING AND CONNECTING RODS FOR 4-6-0 TYPE MODEL.

spirit, and the drip trough for the latter is placed in the middle of the vehicle, and conducted to the lamp reservoir, which may be a small closed cylindrical vessel by a flexible pipe.

The frames of the bogies are inside, but the main frames of the tender are outside the wheels, and limit any excessive swivelling of the bogies when the vehicle is lifted up.

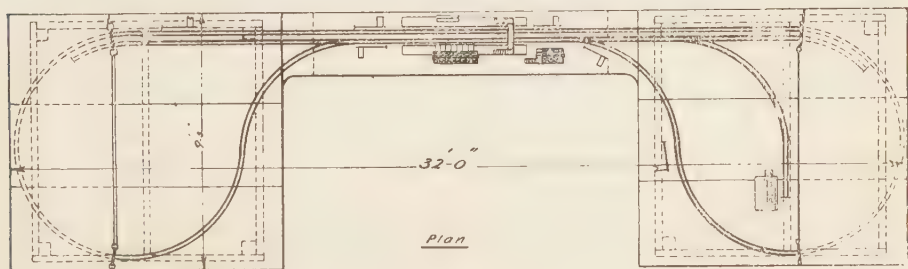


## GREAT NORTHERN RAILWAY MODEL, JAPANESE EXHIBITION, LONDON.

THE East Coast model exhibited last year at the White City having been taken to Brussels, the G.N.R. have arranged, with the help of Messrs. Bassett-Lowke, Ltd., the exhibition of a somewhat simpler model, as shown on the



ELEVATION.

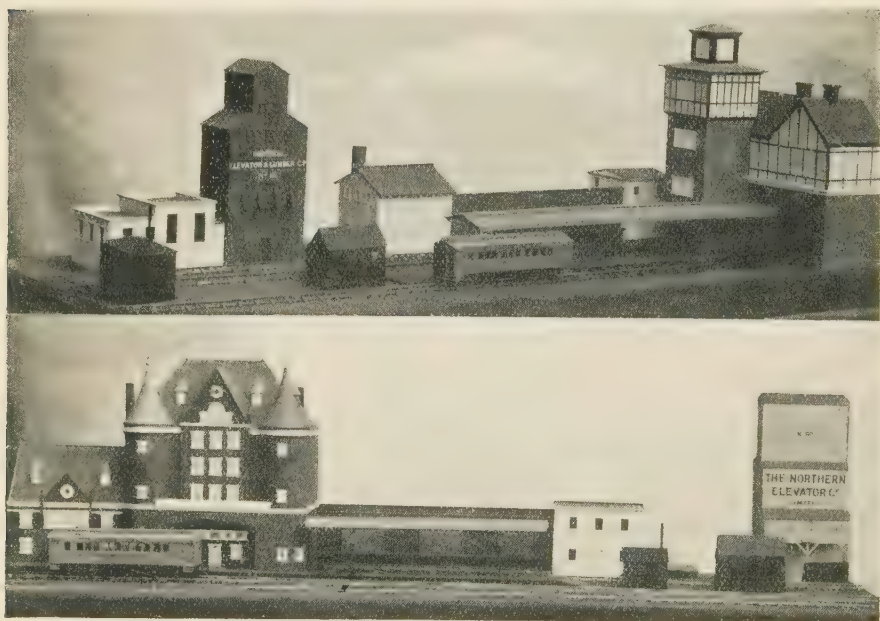


plan herewith. The railway is laid to No. 0 gauge, and the locomotives, which are electrically driven, are the standard No. 0 gauge models. Some of the trucks have been specially made and lettered in accordance with G.N., N.E., and N.B. Railway practice. The line is continuous, with tunnels at each end, and a station as a centre-piece.

## NEW EXHIBITION MODELS FOR THE CANADIAN PACIFIC RAILWAY.

SOME very interesting models have lately been made for the Canadian Pacific Railway Company's exhibits at Brussels and Vienna, in which the many difficulties of providing a realistic reproduction of the features of a railway has been attempted in the smallest size, *i.e.*, No. 0 ( $1\frac{1}{4}$ " gauge).

We are not able to obtain pictures of the model as completely installed, but reproduce herewith some of the leading features. The buildings are



SOME OF THE BUILDINGS OF THE C.P.R. MODEL.

*Top view*—Model power-house and grain elevator, goods station, and passenger station at the "Halifax" end of the model.

*Lower view*—Scale model of "Vancouver" station, and a typical model of a grain elevator.

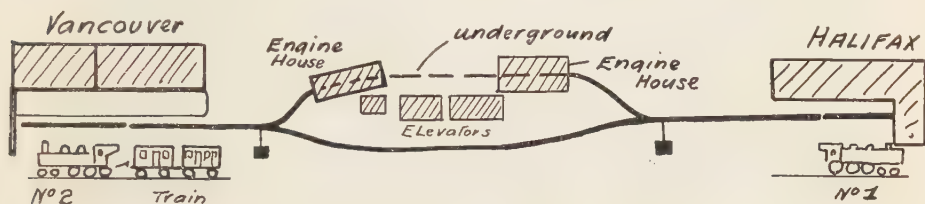
especially well proportioned and also excellently wrought in wood. The station building which is called "Halifax" (*i.e.*, the eastern end of the C.P.R. line) has a tower, and all the lower part is made to represent masonry, every brick being thrown in relief by incised lines. The half-timber work is filled with rough cast. The tile roof is also worked in full relief. The elevators are also very representative of the great Canadian Railway system, and two distinct types are modelled.

Vancouver station is an accurate model of the original building, and some of the huts dotted about the line are modelled from photographs of actual



examples, the weather boarding being properly cut out, and not simply marked by lines scratched on the surface of the wood.

The scheme of the model is novel. The train, which, owing more or less to the limited amount of space available, consists of two coaches and a Pacific engine in the case of the Brussels model, and a 4-6-0 in the Vienna one. Two engines are provided, one (No. 1) with the funnel east, and the other (No. 2) to the west. No. 2 engine and train arrives in Vancouver, the train is automatically uncoupled, and the engine stops on a dead section. At this point the section on which the No. 1 engine at Halifax stands is



PLAN of C.P.R. MODEL

electrified, and it runs back on the main line or through the engine-house as desired. An underground or covered section connects the eastern engine-house with the western one, and the engine emerges on to the main line again and backs on the train, reversing and taking it away. No. 2 engine performs the same evolution on the train arriving at Halifax.



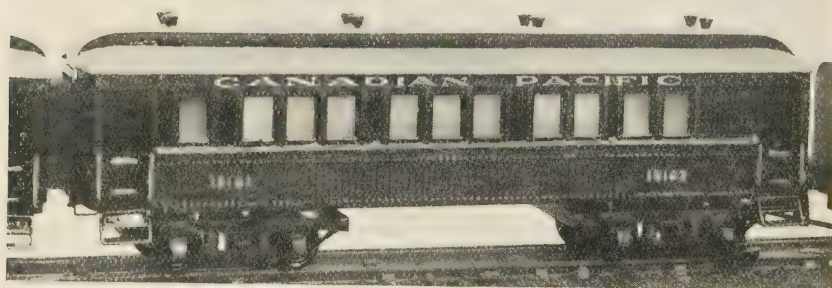
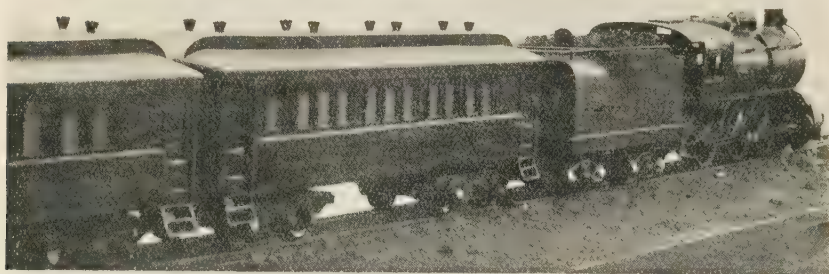
SCALE MODEL No. 0 ( $1\frac{1}{4}$ " GAUGE) CANADIAN PACIFIC RAILWAY  
4-6-2 TYPE LOCOMOTIVE (ELECTRICALLY DRIVEN).

Automatic reversing, coupling and switching are provided for by ingenious, if apparently complicated, mechanically operated switches, some of which will be made available for amateurs' use in the near future.

The engines are made of brass and gunmetal entirely, this allowing them to be oxidized a steely finish, instead of painted. This finish has proved very successful, and is to be emulated wherever possible on small gauge scale models. It does not destroy good workmanship like painting sometimes does.

The coaches are also extremely interesting. As wood was out of the question owing to the fineness of the detail, and the use of tin (as employed

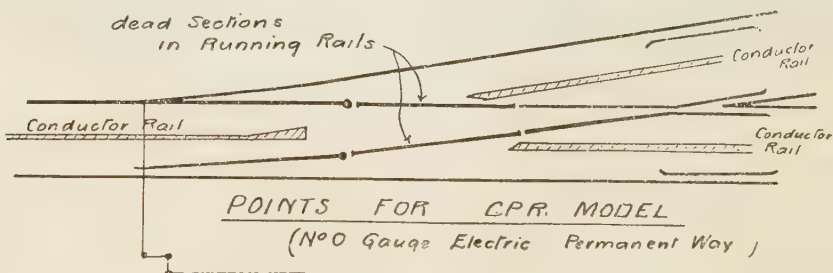
in the standard No. 0 gauge model coaches) impossible owing to the small number required and the prohibitive cost of stamping dies, these coaches have been made in aluminium, cast from metal patterns. The bogies are of correct American design. Five freight cars (in wood) to stand on the sidings



(a) SCALE MODEL NO. 0 GAUGE C.P.R. TRAIN.

(b) SCALE MODEL C.P.R. PASSENGER COACH.

are also provided, and also a three-span girder bridge spanning a gorge in the surface of the model.



Castings for all these parts are available. The whole of the models are from designs by Mr. H. Greenly, and the contractors were Messrs. Bassett-Lowke, Ltd.

The points required specially designing. As two shoes had to be employed and the usual method of preventing a short circuit to the running rails by making the conductor rail at least  $\frac{5}{16}$ " above rail-level and preventing the shoes falling much below this, was impossible in an o gauge model, the plan shown in the drawing herewith was adopted. The running rail is broken at the crossing, and it does not matter in the least whether one of the collector shoes touches it when the engine is traversing the points.



### “MODEL RAILWAYS” G.N.R. MEDALLION.

THE special souvenir which we have prepared in connection with our G.N.R. issue for July is now ready, and is illustrated by the full-size reproduction herewith. As will be seen, the medallion is not too large, and is suitable for the watch chain or fob. The medallion has been made by one of the best firms in the kingdom, and finished in the best style. The front has a representation of a G.N.R. express train treated in low relief, and on the reverse, in neat raised letters, the name of our journal, with a space for initials or name.

As an advertisement, we are supplying our readers the medallions in bronze at the cost price, viz., 1/-, and they can be obtained from our Editorial Office, or from Bassett-Lowke, Ltd., at both their London and Northampton addresses. In silver they cost 2/6 each, and in 9-carat gold 15/6 each. The medallion is reproduced to full size in our illustration.

It is our intention in future *Model Railways* competitions to offer as prizes, medallions in metals according to merit and suitably engraved with the names of the successful competitors.

### RAILWAY OFFICIALS' SUMMER CONFERENCE.

THE summer conference of the superintendents and goods managers of the British railway companies was held at Aberdeen on July 5th-7th. As our readers are probably aware, a similar conference was held at Oban last year, and is arranged by the clearing house officials. The business transacted at the conference is of a private nature, and deals with the various problems of railway travelling. The delegates, however, managed to combine a little pleasure with business and during the stay at Aberdeen, visits were made to Curden Bay, Balmoral Castle, and Grantown-on-Spey. The hosts this year were the Great North of Scotland Railway, and the arrangements were in the hands of Mr. W. Deuchar, superintendent of this railway.

*A Correction.*—Owing to the absence of the Editors in Vienna during June, the passing of the proofs of the special issue was somewhat hurried. In consequence a few hundred copies were printed stating that the G.N.R. new superheater “Atlantics” are to have 21" cylinders. The correct dimensions are 20". No. 265 is also actually fitted with an axle the same as No. 1421, although one of the three-piece axles have been made. The new goods locomotives have 4' 8", not 4' 5" standard boilers. In the majority of the copies the corrections were made.



# Letters to The Editors

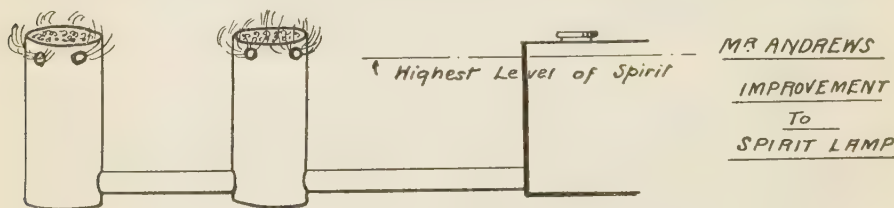


## AN IMPROVEMENT IN SPIRIT WICK TUBES.

TO THE EDITOR *Model Railways and Locomotives*,

DEAR SIR,

I am sending you a sketch of a way of making an ordinary spirit lamp more efficient than it is in the already simple form. In an engine of mine I had no room for any extra wicks, so I hit upon this idea. The tops of the wick tubes or holders are about  $\frac{1}{4}$ " higher than the highest level of the spirit in the reservoir, so I drilled four holes about  $\frac{1}{8}$ " diameter round the wicks



$\frac{1}{4}$ " from the top. When you light up, the flame comes down to the holes and consequently the top part of the wicks are heated and the spirit is vapourised. I have five wicks in mine, and could only keep up 20lbs. pressure, and after doing this to only *one* of the wicks I managed to keep up 50lbs. with the engine running. I have never seen this idea carried out before, and it is very simple. The enclosed rough sketch will illustrate my meaning.

Yours truly,

DURBAN, SOUTH AFRICA.

C. W. ANDREWS.

## THE LOCOMOTIVE WORLD ARTICLES.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I must apologise for once again leading the readers of your excellent journal into inadvertent error in connection with my articles on "Express Locomotives." I humbly acknowledge the correctness of your correspondent's letter in the last issue relative to the locomotives of the N.B.R.; it was a pure accident that I used the wrong name of the two great locomotive families—the Stirlings and the Drummonds—while also the 4-6-0 express engines of the L. & S.W.R. were quite unintentionally overlooked when I attributed the first Scotch "Belpaire" firebox to the N.B.R. "Atlantics," which came into existence several years later.

I have also received a very interesting letter from a North-Country correspondent in connection with the "Express Locomotives of the North-Eastern Railway." He points out that classes F and F1 (p. 101, April) have driving wheels actually 6' 8 $\frac{1}{4}$ " in diameter, as the class S1 engines, the 6' 6" diameter being only nominal, without tyres; also (same page) that 1619 was never included in class M1, but alone formed a special class M.



The whole five engines of class S1 were not built in 1900; only 2111 made its appearance in December of that year, the remaining four being turned out in 1901. My correspondent also mentions the interesting fact that Nos. 2001-3, when first built, were shorter in the tender as well as in the engine, the wheelbase of the former being 12' 0" only against the usual 12' 8". On page 135, line 2 (May), an *erratum* appears: "R1" should read "R."

My friend also sends a valuable correction of a mis-statement which appeared on page 137, where I referred to an apparatus "for shutting off steam automatically, and blowing the whistle to attract the driver's attention." The apparatus, he remarks, does not close the regulator, and he refers me to two distinct arrangements invented by Mr. V. L. Raven, and now in use:—"The first, fitted along the main line between York and Darlington, consists of two cranks in the four-foot, which stand up when the signal is at danger, and are struck by the engine, thus blowing a small whistle inside the cab. The second and more elaborate invention is between Birtley and Durham on the main line, which consists of electrical contacts near the rails, which are touched by brushes on the engines and actuate miniature signals inside the cab, also ringing an electric bell." Neither apparatus is arranged to shut off steam.

My correspondent also makes an addendum to my remark on p. 137 as to the "Atlantic" locomotives being lined in gold. This practice, he states, extends also to the 4-6-0 locomotives and the large 4-4-0 engines of the R1 class.

Readers of your paper will, I am sure, feel grateful to our friend for these valuable additions and corrections to my article, the importance of which will atone for the length of this letter.

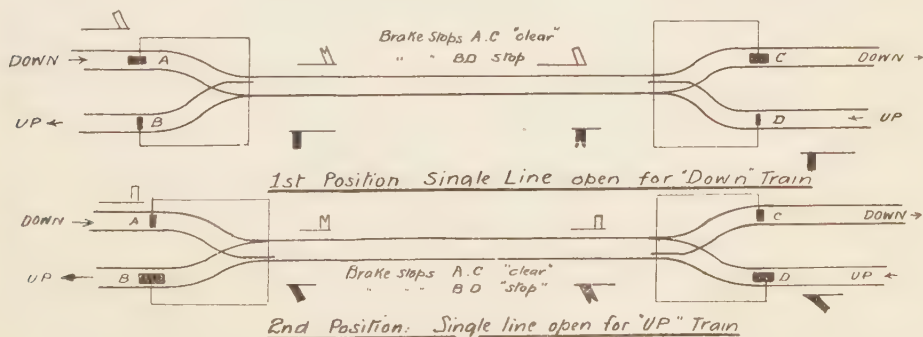
Yours faithfully,

CECIL J. ALLEN.

#### SAFETY DEVICE FOR MODEL SINGLE-LINE WORKING. TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

I am enclosing a diagram of an apparatus which will, I think, suit Mr. Randall's requirements. I am supposing that the single line comes between two sections of double track. As will be seen, the down train cannot pass



on to the single line if there is an up train in the section, and *vice versa*. The brake stops are operated from the same lever as the points, and are connected in a suitable manner.

Yours very truly,

F. HENDREY.

FARNHAM.

## ANSWERS TO CORRESPONDENTS.

F. A.—It is difficult to get a tight fit in a chair if a key is not employed. There is no elasticity in lead.

J. C. S. (Cambridge).—We can get you a copy of the photograph referred to for the sum of 1/6.

G. L. B.—We shall be glad to receive photographs of your model G.N.R. line.

AJAX (Battersea).—Yes! the supplement drawing in our July issue happens to be full size for a No. 0 gauge scale model.

"READER."—The signal with a cross on it is "out of use." The signal like a skeleton key is a species of shunting signal. See our February issue, 1909.

E. F. CRUTCHLEY (Derby).—You do not give any indication of the scale or gauge of the proposed model line.

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## READERS IN DIFFICULTIES.

### DIFFICULTY NO. 109.—RAIL FORMATIONS.

F. H. (Oxford) writes:—I am in great difficulties about a branch line in No. 0 gauge I am making. At the end of the branch there is a loop line. I have one right-handed and one left-handed point, but I find that on the loop the straight rails are too long, as the curves at either end overlap the place where the end of the straight rail on the station road comes to. Can you suggest any way out of this dilemma other than using two curved switches or having straight rails specially made. Can you also tell me a way of using the large radius rails on a double line for both the inner and the outer circles? I am afraid that I am trespassing too much on your kindness, but I should be obliged if you could answer these questions through the medium of your delightful little paper, of which I am a constant reader.

The difficulty is easily overcome by using the standard half-lengths which are supplied for making up the proper formations. There is no way of increasing the curvature of the outer pair of rails of a double-line curve where the standard tin track is employed. You had best use "Lowko" track, employing tin rail if you find the brass too expensive.

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### DIFFICULTY NO. 110.—PAINTING A MODEL LOCOMOTIVE.

G. M. writes:—Will you answer through *Model Railways* the following question? How can I satisfactorily enamel the lines on a model locomotive; also lettering?

There is no royal road to the satisfactory enamelling and lining of a model locomotive. Coach painting and enamelling are trades by themselves, and even among experts there are few who can manage to make a good job of a model for the first time. This being the case, you must either obtain some help from a practical coach painter or enameller, and obtain the necessary skill by practising on the model or on odd pieces of metal. The lining is done with a brush, but you must not take *too* many bottles of paint the night before. We have used a draughtsman's inking pen with some degree of success, but here again we have had the benefit of a certain amount of experience with this instrument, and you may not do so well. The lettering is another branch of the painting business which may prove even more troublesome to the novice. Of course if you can employ some of the standard transfers, the matter is comparatively an easy one. Full instructions as to fixing transfers are given in our issue of May, 1909.

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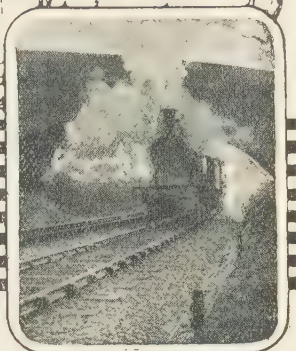
### DIFFICULTY NO. 114.—MODEL CLOCKWORK ARTICULATED LOCO.

D. R. H. writes:—I am thinking of making a model 0-4-4-0 articulated clockwork engine, my "Peckett" engine not being strong enough for my needs. What is the best way of making the boiler, tender, cab, etc., and of what shall I make them?

The idea is a brilliant one, and such a loco should prove very successful indeed. We shall be pleased to receive a photograph and particulars of it when it is completed. Use hard sheet brass for the main frames and sheet tin for the tanks and superstructures. The boiler-barrel may be made of a piece of the lightest brass tube of the required diameter that is obtainable.

# MODEL RAILWAYS AND LOCOMOTIVES

A MONTHLY JOURNAL DEVOTED TO MODEL  
RAILWAY CONSTRUCTION AND WORKING.



Vol. II. No. 9. SEPTEMBER, 1910.

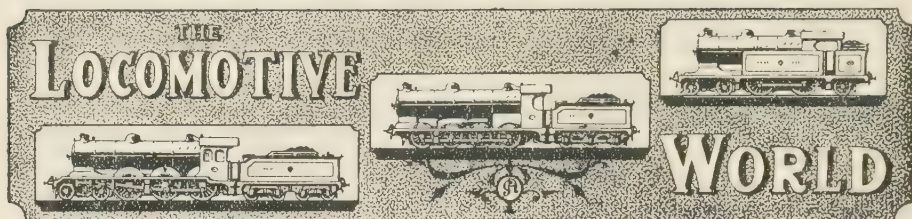
## BETWEEN OURSELVES.

Now that the model building season has commenced, we expect, as usual, that we shall receive numerous questions on model railway subjects, to be answered in our "Readers in Difficulties" column. We are always pleased to do what we can to help our readers individually, so long as the query is one which would prove of general interest, and worth publishing. We would, however, be glad if our readers will write their questions on one side of the paper, and, especially if they enclose separate drawings, put their names and addresses on the back of each piece of paper employed. Questions on entirely different subjects should also be separated.

We would call attention to the excellent article in this issue by Mr. W. H. Jubb, on the latest addition to the locomotive stock of his "Greystones Model Railway." We would point out how Mr. Jubb's work has progressed from quite small beginnings. It is absurd to expect to create a perfect model railway system in a few days. Many of those whom we know have attempted it, have, owing to small disappointments, lost interest before it has been completed. It is much better to have a general scheme in mind, and to add to it piece by piece as opportunity offers. If the owner is making the railway himself, he will be able to see improvements as he goes along, and will have less waste material. On the other hand, if for the most part it is to be purchased ready made, he will buy more judiciously; there will be no engines or accessories placed on the shelf as unusable.

With reference to our correspondent, Mr. W. R. Smart's letter proposing the formation of a "Model Railway Club," the writer is an old member of the Society of Model Engineers. This society is very strong, and comprises many men whose model engineering tastes have a distinctly locomotive and railway flavour. Therefore, before doing anything further, our readers should write to the genial secretary, Mr. Herbert G. Riddle, of 37, Minard Road, Hither Green, and see if his committee can do anything to attract the builders of model railways. There has always been a strong desire among model engineers for information on railway matters, and we are sorry to say that until the foundation of this journal they were not catered for specially. We shall be pleased to give the committee of the S.M.E. our support to any scheme to this end they may inaugurate.





## THE EXPRESS LOCOMOTIVES OF THE HIGHLAND RAILWAY.

BY CECIL J. ALLEN.

WE have been considering under the above heading recently some lines which have to contend with special difficulties in the working of their express train services, particularly the last two described—the North-British, and the South-Eastern and Chatham. The principal difficulty in each of these cases we have found to be that of grading, but the gradients of such lines would seem comparatively easy to run over when compared with the positively appalling grades of the Highland Railway, the like of which are not to be approached on any similar through main line in the country. Long lengths even of 1 in 200 on English main lines sometimes occasion trouble to heavy trains, while the  $\frac{3}{4}$ -mile 1 in 70 grades out of Euston and Liverpool Street have not infrequently furnished a cause for locomotives “sticking on the bank” when overloaded, but such inclines seem insignificant against the 7 miles of unbroken 1 in 70, or 12 miles at 1 in 60 out of 23 continuously uphill which faces the Highland locomotive on the main line.

After leaving Perth, and running over the Caledonian Railway for  $7\frac{1}{4}$  miles, the Highland line proper begins and rising grades also commence almost immediately, as the line enters the narrow defile of the river Tay at Dunkeld—the “Gate of the Highlands”—amid magnificent scenery. The railway rises at moderate grades until the Tay-side is left at Pitlochry; then they steepen past Blair Atholl until from a point just before Struan, the next station, an absolutely unbroken  $13\frac{1}{2}$  miles at 1 in 70–85 commences, including a continuous 7-mile grade at 1 in 70. This toilsome ascent through the wild and bare fastnesses of the Grampians culminates at Balmorran Summit, in the pass of Drumochter, near Dalnaspidal, the highest point attained by any adhesion railway in the British Isles, and no less than 1,484 feet above sea-level. The 15-mile descent into Spey-side is not quite so steep, the gradients to Newtonmore averaging 1 in 80–200. A fairly level stretch for 15 miles follows to Aviemore, but thence, whether following the old route to Inverness via Forres, or the more recently constructed line via Carr Bridge—two more fearsome summits among the wilds of the Monadhliath Mountains have to be negotiated, in the first case at Dava, 1,052 feet above sea-level, and in the second at Slochd Mhuic, 1,315 feet. The 5 miles from Carr Bridge to Slochd Summit average 1 in 60–92, and for an unbroken 23 miles the line falls into Inverness, of which no less than 12 are at the formidable grade of 1 in 60. From Inverness along the less-used Coast line to Wick the grades are comparatively easy, except during the ascent of Helmsdale, and the descent to Georgemas, the junction for Thurso.

The main line is single for its 272-mile length, saving for some 30 miles near Inverness and near Blair Atholl, but, as the changing of single-line tablets is effected automatically, while the passing places are laid out with



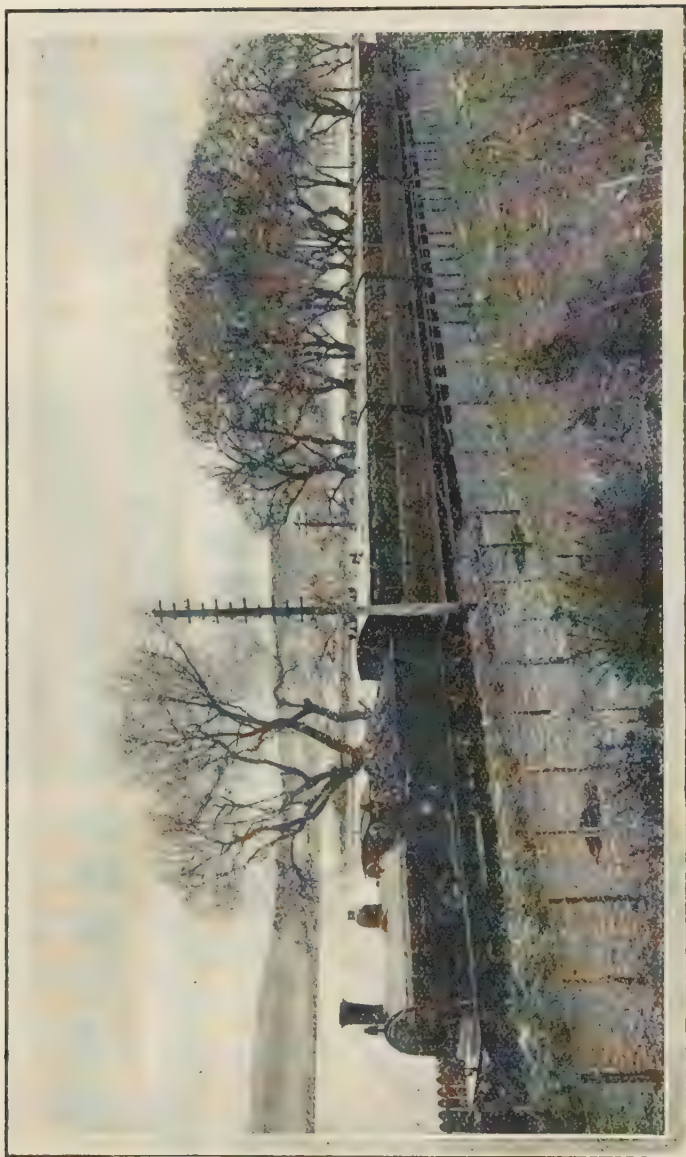
such skill as to cause no appreciable oscillation to trains travelling at high speeds, the single line does not constitute a particular hindrance to fast running. Single-line working, indeed, has probably been brought to more scientific perfection on the Highland line than anywhere else in the country, and very fine locomotive work is performed at times on the more level portions of the line on this account. As an instance, it may be mentioned that, on the institution of the weekly "Further North Express" from Inverness to Wick, one of the 4-4-0 locomotives ran an experimental train from Inverness to Tain, 44 miles, in 45 minutes—an average of 58.7 miles per hour, despite the single-line working for the whole distance. It is, of course, impossible to schedule high speeds for any distance owing to the gradients, and it is also found expedient to keep engines always in steam at the foot of each of the



HIGHLAND RAILWAY. 4-4-0 TYPE EXPRESS LOCOMOTIVE "BEN-Y-GLOE,"

six chief inclines—Blair Atholl, Kingussie, Aviemore (2), Forres and Inverness—for the purpose of immediately giving assistance to heavy trains where required. Four powerful 0-6-4 type tank locomotives have been purchased recently with this special object in view. It is also deemed advisable to limit the speed of expresses down the long inclines to 50 miles per hour, on account of their steep and winding character.

In the locomotive realm the Highland Railway claims a special distinction, that of being the first to introduce the 4-6-0 type of locomotive into this country, and also of being the first to use the six-coupled engine on express passenger service. Mr. David Jones, the late locomotive superintendent, was especially proud of his fine 4-6-0 engines built in 1894, and which existed as a type in splendid isolation until the North-Eastern Railway copied in 1900 the constructional practice which has now become uniform on the majority of the great lines of the country, that of employing the 4-6-0 locomotive on fast and heavy express trains. Among the constructional features of Mr. Jones' locomotives may be mentioned that of outside cylinders, and also fitting the front of the chimney with a louvre or shutter, in order to assist the draft, giving the engines a very curious and characteristic head-on appearance. The last engines of this gentleman's design were 15 in number, of the 4-4-0 type



[D. Whyte, Inverness.

THE "FURTHER NORTH" EXPRESS ON THE HIGHLAND RAILWAY.

Photo by]

with outside cylinders, named after Scottish lochs on the Highland system.

These engines were built in 1896, and were for that period exceptionally powerful machines, on which account their dimensions are of interest. The driving wheels are 6' 3½" diameter, and the bogie wheels 3' 1½"; the coupled wheelbase is 9' 0" and the total 22' 6". The boiler has a diameter of 4' 6", a total heating surface of 1,205 sq. feet, and is pressed to 175 lb. per sq. inch, while the fire-grate has an area of 20½ sq. feet. The cylinders are 19" diameter



by 24" stroke, and a notable feature of construction for so early a period is the provision of piston valves. A large six-wheeled tender is provided, with capacity for 5 tons of coal and 3,000 gallons of water. The weight of engine in working order is one  $49\frac{1}{2}$  tons, and of tender  $36\frac{1}{2}$  tons; total, 86 tons. The names and numbers of these fine machines, all of which are still in active service, are as follows :—

|                    |                      |
|--------------------|----------------------|
| 119 "Loch Insh."   | 127 "Loch Garry."    |
| 120 "Loch Ness."   | 128 "Loch Luichart." |
| 121 "Loch Ericht"  | 129 "Loch Maree."    |
| 122 "Loch Moy."    | 130 "Loch Fannich."  |
| 123 "Loch Andorb"  | 131 "Loch Shin."     |
| 124 "Loch Laggan"  | 132 "Loch Naver."    |
| 125 "Loch Tay."    | 133 "Loch Laoghal."  |
| 126 "Loch Tummel." |                      |

The next series of locomotives, built under the superintendence of Mr. P. Drummond, were also of the 4-4-0 type, and were noteworthy as being the first express engines to be built for the Highland railway with inside cylinders. The pioneer appeared in 1808, and the others have been built at intervals from that time until 1906. The external Drummond characteristics are very marked in these engines, and it would be hard, at a cursory glance, to distinguish them from Mr. D. Drummond's first 4-4-0 locomotives on the L. & S.W.R. These engines are slightly smaller than those previously mentioned; the boiler has a heating surface of 1,175 sq. feet only, and the grate an area of 20.3 sq. feet; the cylinders are  $\frac{3}{4}$ " less in diameter but 2" greater in stroke— $18\frac{1}{4}$ "  $\times$  26"; the working pressure is 175 lbs. per sq. inch, as before, but the weight of the engine is one of 46 tons only. The tender has the same capacity, and weighs one ton more, the total weight of engine and tender in working order being  $83\frac{1}{2}$  tons. The names and numbers of these twenty engines, which are

named after Scottish mountains on the Highland system, are as follows :—

|                  |                    |                     |
|------------------|--------------------|---------------------|
| 1 "Ben-y-Gloe."  | 8 "Ben Clebrig."   | 15 "Ben Loyal."     |
| 2 "Ben Alder."   | 9 "Ben Rinnies."   | 16 "Ben Avon."      |
| 3 "Ben Wyvis."   | 10 "Ben Slioch."   | 17 "Ben Alligan."   |
| 4 "Ben More."    | 11 "Ben Macdhuil." | 38 "Ben Udlaman."   |
| 5 "Ben Vrackie." | 12 "Ben Hope."     | 41 "Ben Bhach Ard." |
| 6 "Ben Armin."   | 13 "Ben Alisky."   | 47 "Ben A' Bhuidr." |
| 7 "Ben Attow."   | 14 "Ben Screel."   |                     |



A further development of the "Ben" class appeared in 1908, when a further series of these engines, identical in general dimensions, but with larger and considerably higher-pitched boilers, of which the heating surface was raised to a total of 1,648 sq. feet, and the working pressure to 180 lbs. per sq. inch. The weight of the engine was also raised to  $49\frac{1}{2}$  tons, or the same as that of the "Loch" class, and of the tender to  $38\frac{3}{4}$  tons, a total of  $88\frac{1}{4}$  tons in working order. On account of the higher level of the top of the boiler, the safety valves have been removed from the top of the dome to the more usual position above the firebox. The names and numbers of the six locomotives of the enlarged "Ben" class built up to the present are:—

|                       |                       |                   |
|-----------------------|-----------------------|-------------------|
| 60 "Ben Breach Mohr." | 62 "Ben Meadhoin."    | 64 "Ben Mholach." |
| 61 "Ben na Caillich." | 63 "Ben A'Chaoruinn." | 65 "Ben A'Chait." |

Meanwhile, on the need arising in 1900 for further engines of high power, on account of the increasing weight of the trains, a series of greatly enlarged engines of the 4-6-0 type were designed, and named after historic castles on the Highland line. On account of the exceptionally heavy grades, the diameter of the driving wheels was reduced to 5' 9", the bogie wheels having a diameter of 3' 3". The spacing between the leading and driving wheels is considerably less than that between the driving and trailing, the latter having been increased in order not to limit the size of the fire-grate. The total coupled wheelbase is 14' 3". The small driving wheels of these engines are apparently no bar to the attainment of high speeds, as I have frequently timed them at speeds of well over a mile-a-minute on the more level stretches with heavy trains.

The cylinders are again placed outside the frames, and have a diameter of  $19\frac{1}{2}$ " with a stroke of 26". The boiler, which is pressed to 180 lbs. per sq. inch, is of large dimensions, having a heating surface of no less than 2,064 sq. feet, while the area of the fire-grate is  $26\frac{1}{2}$  sq. feet. The wheelbase of the engine is 26' 3", and the weight in working order 58 tons, of which 44 tons are available for adhesion—a valuable provision for such heavy work. A large tender is provided, mounted on two four-wheeled bogies with wheels 3' 6" diameter; it has a capacity for 3,350 gallons of water and 6 tons of coal, and weighs in working order 39 tons. The total length of engine and tender over buffers is 52' 6", and the total weight 97 tons. These locomotives have a particularly handsome and well-balanced appearance. Their names and numbers are:—

|                             |                       |                        |
|-----------------------------|-----------------------|------------------------|
| 140 "Taymouth Castle."      | 144 "Blair Castle."   | 147 "Beaufort Castle." |
| 141 "Ballindalloch Castle." | 145 "Murthly Castle." | 148 "Cawdor Castle."   |
| 142 "Dunrobin Castle."      | 146 "Skibo Castle."   | 149 "Duncraig Castle." |
| 143 "Gordon Castle."        |                       |                        |

No. 146 "Skibo Castle" will be familiar to readers as the engine mentioned in the August number of *Model Railways* which has been running in competition with No. 867 of the North-British Railway—a large locomotive of the 4-4-0 type. The precursor of a further series of these powerful machines has just been delivered to the Highland Company. It is numbered 30, and named "Dunvegan Castle."

The engines of the Highland Railway are painted a pleasing and subdued shade of green, unrelieved by any lining, and harmonizing exactly with the coaching stock. The complete title of the company "The Highland Railway" appears in full across the tender in shaded letters of gold. It would be hard to find a neater or more symmetrical series of locomotives, each type of which is admirably suitable as an easily copied prototype for the model engineer.



## THE NEW L.N.W.R. 4 4-0 LOCOMOTIVES "GEORGE THE FIFTH."

FOR some months past students of the locomotive have been awaiting the first engines of the company's new locomotive engineer, Mr. C. J. Bowen Cooke. As most readers know, the engines first came under public notice on their being employed to haul the Royal holiday train to Scotland last month. They are appropriately named "George the Fifth" and "Queen Mary." As will be seen by our photograph, the new engines are of the "Precursor" type, with the following external modifications:—The wheel



Photo]

[Topical Press.

### THE NEW L.N.W.R. FOUR-COUPLED EXPRESS LOCO "GEORGE THE FIFTH."

splashers are something like the "Experiment" class locomotives, except for the portion over the coupling-rods, in which the "Precursor" design, which has so long been a distinctive feature of L.N.W.R. locomotives, is retained. The bogie wheels are smaller (3' 3" instead of 3' 9") and are arranged to swing under the main frame plates. The smokebox is also slightly extended. The notable feature of the new engines is that they are fitted with super-heaters and larger cylinders, this giving those outside the official circle an excellent idea as to lessons learnt from the experiments with the C.R., G.N.R., and L.B.S.C.R. locomotives on the North-Western line last year. We think that we shall hear more of super-heated simple locomotives than of compounds in this country in the near future.

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## NEW TRADE BOOKLET.

JUST before closing for press we received an advance copy of the new booklet entitled "Run your Own Service," issued by Messrs. Bassett-Lowke, Ltd. This is quite a new departure of theirs in advertising, and is an attractive publication of 22 pages. It is well illustrated with line drawings and photographs, and is written in the popular style suitable for the lay mind. A post card to either their London or Northampton address will secure a copy.

### LOANED LOCOMOTIVES.

AT the time of writing (the mid month) the locomotive experiments which created so much interest last year have been renewed, this time by the Great Western and London & North Western Companies. At the outset both of the locomotives which have been exchanged—No. 1471 L.N.W.R. "Experiment" type loco "Worcestershire," and the G.W.R. four-cylinder six-coupled engine "Polar Star"—did not do very well, owing perhaps to causes quite outside their respective merits.

On one of the initial trips the Great Western engine which drew the 12.10 Euston to Crewe non-stop train, failed at Rugby, and the North-Western engine ran short of water at Savernake, thus breaking the non-stop run from Paddington to Plymouth, and arriving, we understand, 33 minutes late at its destination.

The Great Western has a distance of 72 miles between water-troughs on the run to Bristol. The greatest distance between troughs on the North-Western is only 40 miles, these being placed as follows:—Bushey 16, Castlethorpe 56, Rugby 85, Tamworth 113, Whitmore 148, Crewe 158 miles from London. This may account for the trouble with the L.N.W.R. engine.

As to the Great Western locomotive, it was remarked, in our hearing, that no engine had ever negotiated "Camden" bank (the steep incline out of Euston station) in such a splendid manner.

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### IMPROVEMENTS IN THE "PRECURSOR" TANKS.

Nos. 616 and 1164 "Precursor" tanks have been running experimentally with an apparatus for increasing the draught of the blast-pipe—a plan similar to that on some of the Great Western engines, whilst No. 1427 of the same class of tanks is fitted with a feed-water heater.

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### THE REID-RAMSEY STEAM TURBINE ELECTRIC LOCOMOTIVE.

THE huge experimental locomotive which has been built at the North-British Locomotive Company's Works, and is appropriately named the "electro-turbo-locomotive," has been subjected to its preliminary trials on the main lines of the Caledonian and North British Railways. The locomotive recalls the famous Heilmann engines experimented with in France fifteen or twenty years ago. The engine runs on two compound eight-wheeled bogies, four wheels on each of which are driven by electric motors. These are supplied with current from a steam turbine and dynamo, which obtains its power from an ordinary locomotive boiler fitted with a super-heater. The locomotive is admittedly an expensive piece of machinery, and we trust it will prove a success; but we have our doubts!

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### G.W.R. COACH BUFFERS.

A CORRESPONDENT, Mr. W. R. S. Smart, writes:—At Paddington the other day I noticed on a brand-new Great Western coach a new buffer, in which the shank was flat, and presume that it is done to prevent the oval head turning out of its proper horizontal position.



(Continued from page 266).

III.—THE GREAT EASTERN RAILWAY.

The signals on the Great Eastern Railway are of a simple and neat type, and are made in four varieties—home, distant, shunting and reception line, and “ calling-on ” arms. The home and distant signals are of the same general pattern, and are arranged to pull off to an acute angle with the post, as is the case on the Great Western Railway. The general design of the arm is straightforward, and is apparent in Fig. 14. The spectacle is attached direct to the spindle casting, and the spindle itself passes through the post.

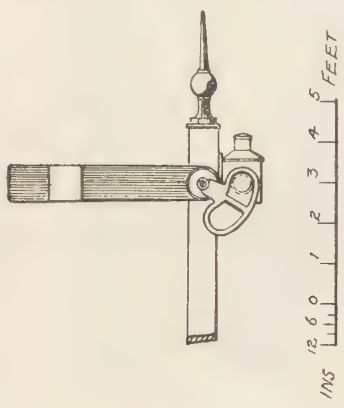


FIG. 14.—STANDARD G.E.R. HOME SIGNAL.

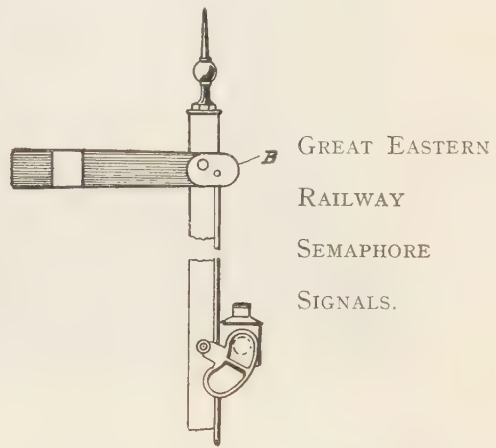


FIG. 15.—HOME SIGNAL ON TALL POST, WITH LAMP AT LOWER LEVEL.

In cases where a very high post is erected, with the lamp at a lower level (Fig. 15), an extended spindle casting (B) is fitted, in order that the arm may balance itself correctly at danger should the vertical connecting-rod break. It may be added here that it is an essential feature of signal construction that the arm should be so designed and balanced that it would immediately return to danger in the event of the breakage of either the wire from the box, or the rod on the post. The principal counterweight to the arm is, of course, the front spectacle; the back-light spectacle also acts as a balance weight, but it is not wise to regard this as a permanent counterweight, seeing that it is not invariably fitted. The weight of the rod and the balance-weight at the foot of the post when fitted serve to counterbalance the slack on the wire from the box. The longer the wire, especially in the case of distant signals, and worst when it has to work round sharp curves, the heavier the balance-weight required.

## AN "ATLANTIC" TYPE LOCOMOTIVE FOR 2" GAUGE.

By W. H. JUBB.

THE following is a description of a 4-4-2 type tender locomotive, which the writer feels he can claim is a little out of the ordinary, inasmuch as it is built to run on an indoor 2" gauge model railway with curves of 4' 6" radius. There must be many other readers of *Model Railways* who, like myself, are pinched for room, and yet have a hankering after that most popular type of model, the "Atlantic."

The writer's railway, as previously described in this monthly, is in a room 19' x 16', and the curves, as previously stated, are 4' 6" radius. Now one is repeatedly advised not to build an "Atlantic" loco for an indoor



FIG. 1.—PHOTOGRAPH OF FINISHED ENGINE.

railway with small curves, and that failure would result as regards the ability of the engine to traverse the curves, but nevertheless the writer decided to "have a go" at a 4-4-2 to suit his particular.

I must confess now the engine is finished, that she would show to better advantage on a long straight track, as owing to the curves she never gets thoroughly into her "stride," but the photos will show that a powerful looking model has been produced, which in size reaches the limits of the loading gauge. She will pull a big load, and has never yet been derailed, although she has been run without a load at high speeds. The curves by the way, are super-elevated about half an inch on the outer rail.

The outline drawing will show readers how the frames are cut away at bogie and trailing wheels. The bogie frame is Adams type, with  $\frac{1}{4}$ " side-play each side of the pin, and is sprung on the rail by a spiral spring working in a central socket on the stretcher bar casting between the main frames.

The cylinders are raised high so that the piston-rod, cross-head, and valve spindles clear bogie wheels. The trailing wheels run in a pony truck



as shown in *The Model Locomotive*, Fig. 82, page 85, but I have allowed a little more side-play.

The cylinders are built in auxiliary frames, as sketch, and can be detached from the engine in a few minutes for repacking, etc.: this I have found to be a great convenience. The footplating in front of the smokebox is also detachable, so as to facilitate getting at the front cylinder covers.

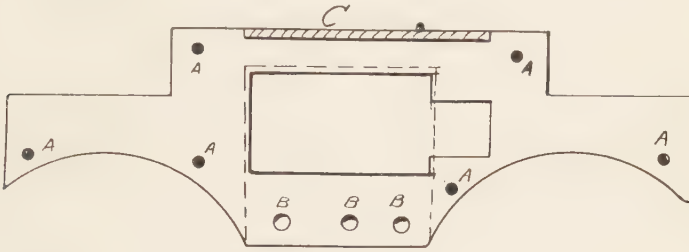


FIG. 2.—SKETCH OF AUXILIARY FRAMES FOR THE CYLINDERS.

A—Holes for screwing to main frames. B—Holes for screwing to bogie pin stretcher.  
C—Angle plate for supporting cylinders.  
(Dotted lines indicate how main frames are cut away.)

Readers will note that the front axle is the driving axle, and not, as is usually the case in outside cylinder "Atlantic" locomotives, the trailing axle. This is another novel feature, as by using the leading axle for the driving wheels, the firebox can be made an unusual length, the result being a much greater real heating surface, and, best of all, an almost perfect combustion of the methyated spirit. Readers will see that the firebox extends

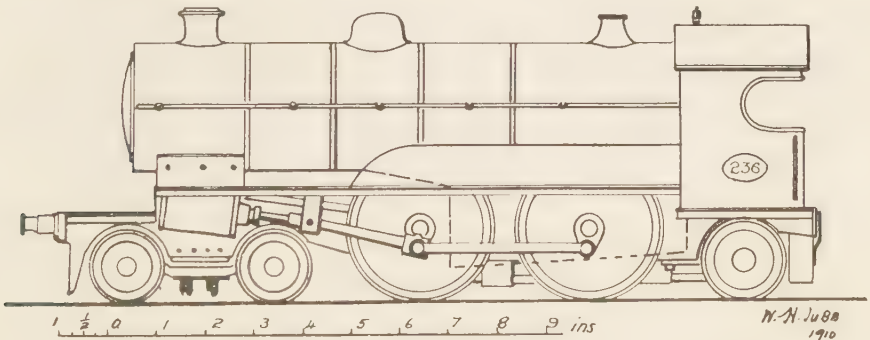


FIG. 3.—DIAGRAM OF LOCOMOTIVE (ONE-QUARTER SIZE OF MODEL).

nearly half the length of the boiler, and that two-thirds of the length of the water-tubes are being subjected to the heat of the flame, and not gases. Then, again, the large outer shell gives the gases ample room to clear. At any rate, "actions speak louder than words," and this boiler will raise 60lbs. steam from cold water in five minutes, and has done so in the presence of some other model engineers—this, of course, with everything in perfect order, lamp burning perfectly, etc., etc. I don't know, but I should think this constitutes

something of a record in boilers fired by a plain spirit lamp. Steam is flame superheated, and a fire door is fitted so that lamp can be watched. The wick tubes are kept very low.

The inner boiler is  $\frac{3}{8}$ " copper, and is hard soldered throughout.  $\frac{3}{4}$ " water-tubes only are fitted, so as to give the gases a free passage to the smokebox. A displacement lubricator is fitted to cylinders, and this has been found to be a great advantage. The boiler is fixed to frames by six screws, which fasten the main frames to the saddle, and four screws through the firebox sides. The cab is quickly removed, and the boiler also, for any repairs which may be required.

Frames, footplating, cab, tender body, boiler outer shell, coupling and connecting-rods, are all German silver. Cylinders, eccentrics, wheels and boiler fittings are all the standard patterns. Slip reversing is used. Tender carries about  $1\frac{1}{2}$  pints of methylated spirit. Tender and engine must not be too closely coupled on  $4' 6"$  curves.

Engine is enamelled with the special Great Western green, lined black and white, lettering vermillion and gold, buffer-beams and frames (inside) vermillion, and cab interior oak. I noticed in August *Model Railways* a reader put some queries regarding the lining of models. I line my models with a very small camel-hair brush, and find it equally as good as a liner; but the main thing is practice and a very steady hand. Should any other further details of the loco described be required, I shall be happy to supply them to readers of *Model Railways*. Full dimensions are as follows:—

#### ENGINE :

|                                                                      |                                                              |
|----------------------------------------------------------------------|--------------------------------------------------------------|
| Length over all $17\frac{1}{8}"$                                     | Trailing wheel centres to back buffer-beam $2\frac{1}{8}"$ . |
| Height from rail to top of funnel $6\frac{1}{8}"$ .                  | Cylinders $\frac{1}{2}" \times \frac{3}{4}"$ .               |
| Height from rail to boiler centre, $4"$ .                            | Width over footplating $3\frac{5}{8}"$ .                     |
| Front buffer-beam to bogie centre $3"$ .                             | Bogie wheels $1\frac{5}{16}"$ diam., 10 spokes               |
| Bogie wheelbase $3"$ .                                               | (Catalogue No. H 74).                                        |
| Bogie centre to driving axle $4\frac{1}{2}"$ .                       | Driving wheels $2\frac{7}{8}"$ diam., 20 spokes              |
| Coupled wheel centres $3\frac{1}{2}"$ apart.                         | (Catalogue No. H 71A).                                       |
| Coupled wheel centres to centre of trailing wheels $3\frac{1}{4}"$ . | Trailing wheels $1\frac{1}{2}"$ diam., 10 spokes             |
|                                                                      | (Catalogue No. H 55).                                        |

#### BOILER :

|                                                                                              |                                          |
|----------------------------------------------------------------------------------------------|------------------------------------------|
| Length over all outer shell $11\frac{3}{4}"$ .                                               | Length of inner boiler $9\frac{1}{2}"$ . |
| Diameter of outer shell $2\frac{7}{8}"$ .                                                    | Three $\frac{1}{4}"$ water-tubes.        |
| Diameter of inner boiler $2\frac{1}{8}"$ .                                                   | Fittings, standard model.                |
| N.E.R. safety valve, G.N. dome and funnel, "Lowko" pressure gauge regulator and check valve. |                                          |
| Grate $4\frac{5}{8}"$ long $\times$ $1\frac{5}{8}"$ wide.                                    |                                          |
| Fired by plain spirit lamp with six $\frac{3}{4}"$ flat wicks.                               |                                          |

#### TENDER :

On two four-wheel bogies.

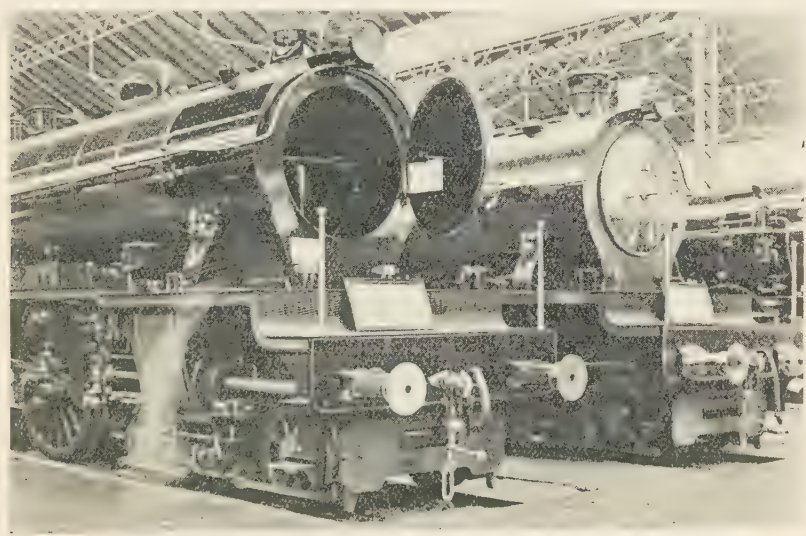
|                                       |                                                      |
|---------------------------------------|------------------------------------------------------|
| Wheels $1\frac{3}{8}"$ diameter.      | Height over all from rail $4\frac{5}{8}"$ .          |
| Wheelbase of bogies $2\frac{3}{8}"$ . | Carries pump for feed water and spirit. (No. 721/2). |
| Bogie centres apart $5\frac{1}{8}"$ . | Visible drip feed used.                              |
| Length of tender over all $11"$ .     |                                                      |

Length of engine and tender over all,  $28\frac{1}{8}"$ .

## LOCOMOTIVES AT THE BRUSSELS EXHIBITION.

*Specially written for Model Railways by L. HERVE.*

A LARGE hall has been specially consecrated as a Temple for the Adoration of Locomotives at the above Exhibition, and a splendid sight it is to glance round at the large array of spotless machines, resplendent in their various liveries, glorious in the glistening of their brass-work and big with latent power and speed. No particularly new type of loco is there to startle the eye of the onlooker, but developments and enlargements of well-known types on various lines afford, all the same, plenty of food for study as the solutions to different problems present themselves; one thing is common to all locos present—the perfect finish and detail of construction, and also the care



A PHOTOGRAPH IN THE BELGIAN LOCOMOTIVE SECTION.

lavished on the smallest rivet, screw or nut. To British visitors, however, apparently, complications have rarely been waived aside, nay, seem to have been actually courted at times, and though an English loco superintendent may pronounce them *anathema*, they don't seem to create the difficulties that all the goody-goody wiseacres at home invariably prophesy; you don't hear of more breakdowns, stoppages or dropping to bits than are heard of in England because of three or four cylinders and valve-motions, various appliances, and, may be, a round dozen or rods, pipes and handles for working some device.

How can it be, then? Is it that the "benighted foreigner" knows his business as well as we do, or, rather, better? Can he handle with ease,

comfort and efficiency, machines the mere sight of which would send the whole locomotive department of our lines—crack or non-crack—into convulsions, and the running staffs to an asylum or premature graves?

Who is in the right, and who is in the wrong? Possibly the answer is that the Englishman does not place his aims as high as the Continental man, and is contented to jog along on the happy-go-lucky methods of his forefathers, simply tacking on half or an inch to his cylinder diameter, 200 sq. feet to his heating surface, and 10lbs. to his working pressure, and resting contented under the impression that he has now a perfect locomotive, as Don Quixotte was with his cardboard helmet. But then it is a well-known fact that our locos are worked to the extreme limit of their powers, and uneconomically, whereas abroad it is almost invariably the contrary.

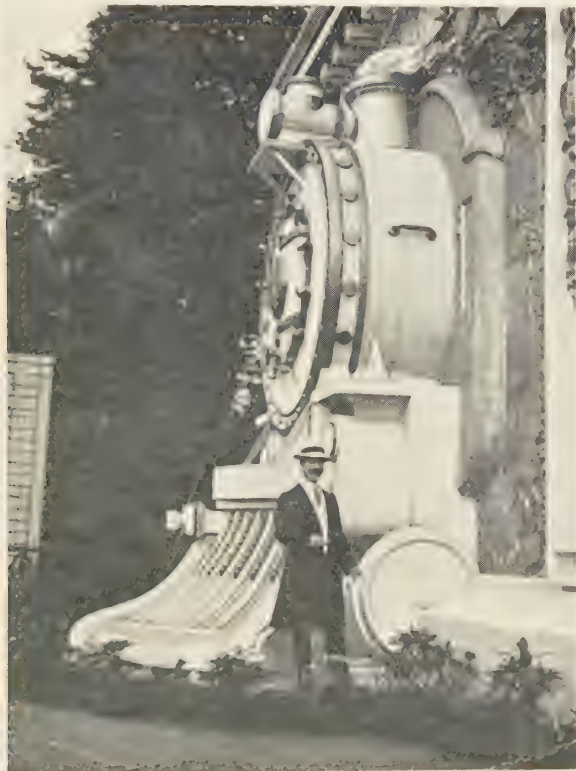
In a nutshell the problem, the eternal problem, is the following: Heavier weights, higher speeds—I must beg the reader's pardon, higher speed is not the eternal problem in England; we solve it in many cases, too many cases, by two means—deceleration or stagnation, but then, of course we know better! How does this foreigner manage things when he wants his trains to run faster and heavier?

*A tout seigneur tout honneur!* Let us see what the Belgian State Railway's solution is, as presented by Monsieur Flamme, its eminent engineer. The trains on the main lines of this system are not particularly swift, when the timings come to be considered, but the lines are difficult owing to multiple junctions and curves, besides which, in the eastern part of the kingdom, severe gradients are encountered; all this necessitates powerful locomotives, able to attain their running speed quickly, and capable of doing hard collar-work when climbs have to be surmounted. The international traffic across Belgium in all directions is extremely important, and care has to be taken not to dislocate the traffic of neighbouring countries, Holland, Germany, France, by failures or delays, and for these services, Belgium has recently put on the line a fine type of six-coupled four-cylinder simple superheated balanced locomotives of the 4-6-0 kind.

All the important Belgian firms are turning out those locos on the same pattern, and at the Exhibition figure specimens by the Thiriau-La Croyère shops, the Ste. l'Energie (Marcinelle), La Meuse, Gilain (Tirlemont), Biesme, the Gilly Works, etc. The four cylinders,  $17\frac{1}{2}$ " bore by 25.39" stroke, drive the leading coupled axle, the driving wheels being 6' in diameter; two outside Walschaert valve-motions drive the four piston valves, somewhat after the same fashion as the G.W.R. four-cylinder simples, and the reversing is performed by a combination of lever and screw apparatus. The heating surface is 1,668.46 sq. feet, grate area 33 sq. feet, working pressure 199.12lbs. to the sq. inch, the super-heater heating surface being 411.73 sq. feet. A fine large well-lighted cab protects the enginemen, and, with brass bands round the boiler and a brass cap round the chimney-top, these engines have quite a smart appearance. A fact worth noting is that complications are apparently few, no unsightly accumulation of domes, pipes, handles, or bars mar the sober lines of the machines; they have the usual standard appliances of combination injectors on the back of the firebox, steam-heating, Westinghouse quick-acting brake, Friedmann force-feed lubricator, etc. Altogether it may be said that this locomotive, out of all the others present, approaches the nearest to the British *beau-ideal* of simplicity of design and detail, and their performance, if not sensational in any way, is that of solid, punctual, substantial, all-round work.



But, apparently, this type is not heavy or strong enough for the work in store, and a new type (type 10) has already materialized in the shape of a big, cumbersome "Pacific" locomotive, 4-6-2, with a short boiler, a rather uncouth combination not likely to find favour with the model enthusiast. A "Pacific" is naturally a huge machine, and this Belgian one conforms to the rule, though with characteristics of its own. The boiler is of the semi-coned type with wide fire-box, the inside frames passing through the ash-pan, and being supported on either side by vertical brackets fixed to a small exterior frame stretching from about the middle coupled axle to the rear, and forming a loop to the underside of the ashpan; the smoke-box finishes about level with the trailing bogie wheels, so that the front part beyond is a big square



THE EXTERIOR OF THE C.P.R. BUILDING, BRUSSELS EXHIBITION.

box containing the inside cylinders, the locomotive being also of the four-cylinder simple, superheated and balanced type: the outside cylinders driving the middle coupled axle, and the inside driving the leading coupled.

Only one pair of Walschaert valve-motion is employed: the valve-spindles of the outside piston-valves being extended in front and connected to a rocking shaft which drives the inside valves. The four cylinders have a 19.68" bore with a 25.98" stroke: the driving wheels being 6' in diameter: heating surface 2,583½ sq. feet, superheater heating surface 607.38 sq. feet, grate area 53.82 sq. feet, working pressure 190 lbs. to the sq. inch. The weight of the engine

in working order is 102 metric tons, or about 98 English tons. The cab is extremely large, roomy and light, and there are two firebox doors to facilitate the judicious distribution of fuel over the huge grate. Three specimens of this type, built respectively by John Cockerill, the St. Leonard Works, and Zimmermann-Hanrez of Monceau-sur-Sambre, figure at the Exhibition, and as may be guessed, attract considerable attention.

The third and last important specimen exhibited by Belgium is a very large and powerful goods engine of the 2-10-0 kind; in order to get the necessary flexibility of wheelbase, the leading carrying axle and leading driving axle are arranged together in a special bogie of the Zara type embodying Mons. Flamme's modifications to the original. The pivot is placed a good distance behind the geometrical centre, so that the driving wheels should be as little disturbed as possible going round curves; of course the coupling-rod pins are spherical, to allow for the side-play, and the trailing axle has similar pins to allow for the lateral motion permitted by the box and hornblock. These machines are also four-cylinder simples, the outside cylinders driving the third coupled axle and the inside driving the second, the diameter of wheels being 4' 9", and cylinders 19.6" bore by 25.3" stroke; the total heating surface is 2,571 sq. feet, super-heating surface 667.38 sq. feet, grate area 55 sq. feet, working pressure 199.12 lbs. to the sq. inch. Three specimens of this type of locomotive are exhibited respectively by the Franco-Belge Works of La Croyère, the Tubize Works, and the Haine St. Pierre Works.

Two other Belgian models are worth notice, as being nearly exact copies of English locomotives, viz., a six-coupled inside-cylinder goods and a 4-4-2 suburban tank, similar to our own G.N.R., L.B. & S.C.R., G.C.R., etc., patterns. Both are fitted with super-heaters and piston-valves of the Schmidt type, the goods loco having cylinders 19.6" diameter by 25.9" stroke, 1,034 sq. feet of heating surface with a supplementary 227 sq. feet for the super-heater, working pressure 192 lbs. to the sq. inch, and grate area 27 sq. feet; the suburban tank's dimensions being 870 sq. feet heating surface, super-heater 182 sq. feet, cylinders 18.1" bore by 24" stroke, pressure 177.88 lbs., and grate area 27 sq. feet.

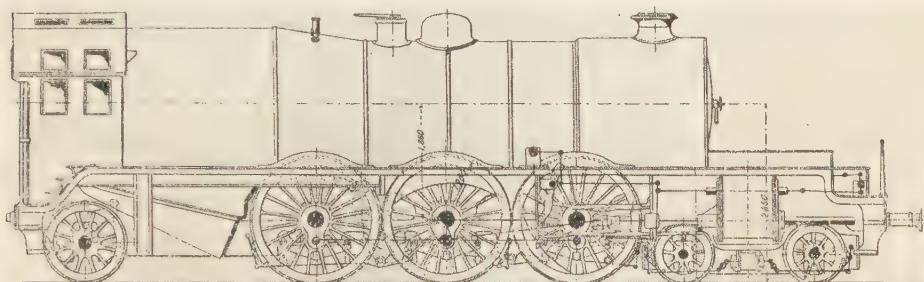
Besides these main line engines there are many specimens of smaller tanks for standard or narrow gauges and tram-locomotives of 0-6-0 type with enclosed outside motion for the Chemins de Fer Vicinaux.

One detail in all these Belgian machines is particularly striking, that is the total abandonment of the Belpaire firebox, which we, on our side of the Channel, have adopted with avidity in many cases; this is all the more noticeable that this flat-topped firebox is a Belgian invention and was standard for many years on all locomotives.

The next items on the programme are a couple of Italian locomotives, an express passenger engine of the 2-6-0 kind with inside cylinders and outside piston-valves and motion, and a 0-10-0 goods, the first being by the firm of Ernesto Breda, Milano, and the second by the Officine Meccaniche, Milano. The 2-6-0 engine is provided with a Zara bogie, having the leading carrying axle and the leading driving axle in its frame, the two middle and trailing axles forming the rigid wheelbase, a most economical and elegant solution to the adhesion problem. The valve gear is a modified Walschaert arrangement driving outside piston-valves; the leading dimensions are: heating surface 1,080 sq. feet, super-heater 360 sq. feet, working pressure 170.6 lbs. to the sq. inch, grate area 24 sq. feet, cylinders 21" diameter by 27½" stroke (a remarkable dimension for inside cylinders), driving wheels 6'. This is a

very neat and substantial locomotive of simple design and construction, and well adapted for hauling heavy loads on a moderately strong permanent way at a fair speed. Let us hope that one fine day some eminent man may re-invent the Zara bogie in England amidst pæans of praise and plenty of incense swinging, and thus become a public benefactor to some of our lines who may have, like Italy, moderately strong permanent ways!

Turning to the ten-coupled goods, we find that the leading and trailing axles have plenty of side-play, with spherical coupling-rod pins, and that the middle axle has wheels with "blind" tyres, *i.e.*, without flanges. The coal-bunkers are on the locomotive, consisting of side-bunkers and a large one on the top of the firebox, the tender being an entirely separate vehicle, half-



BELGIAN 4-CYLINDER SUPERHEATER "PACIFIC" EXPRESS  
LOCOMOTIVE, TYPE NO. 10.

tender, half-guard's van; probably our readers recollect that Italian engineers are particularly fond of devising strange and startling arrangements for fuel and water carrying; this production is the latest "sigh" from fair Italy. We leave to the reader's imagination the exclamations, complimentary or otherwise, which could be provoked by running a machine of this kind on our North Country lines; the very asphalt would melt on the platforms!

We now come to the French section, the most important in the building after the Belgian, and extremely interesting also, being more varied in specimens than the Belgian, if less abundant.

(To be continued.)

IN view of the recent agitation in favour of using electric headlights on locomotives, the experiments in this direction of Professor Benjamin, of Purdue University, are most interesting. Professor Benjamin has found much to be said against the electric headlight. Not only does the strong beam of light blind engineers on locomotives coming from the opposite direction, but it also has a peculiar effect of producing false signals. In one of his experiments, states the *Scientific American*, the light of a green signal was extinguished, but when the beam from the electric headlight fell upon the green roundel it was powerful enough to reflect a green light, which appeared to the engineer to be a caution signal. This effect persisted until the engine was within 400 feet of the signal. On the other hand, in favour of the electric headlight it has been pointed out that obstructions on the track are readily seen far enough off to permit of stopping the train before they are encountered. Furthermore, on a single-track line the presence of a train may be detected at a long distance off and head-on collisions may thus be prevented.

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**MODEL 3 $\frac{1}{4}$ " GAUGE L.N.W.R. EXPRESS LOCOM**

## FRAMES OF STANDARD 3,000 GALL



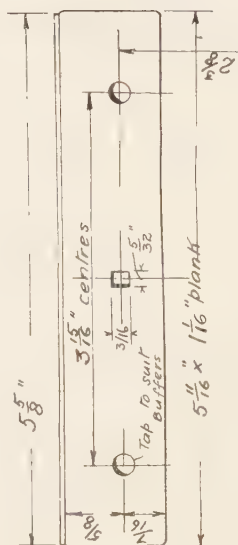
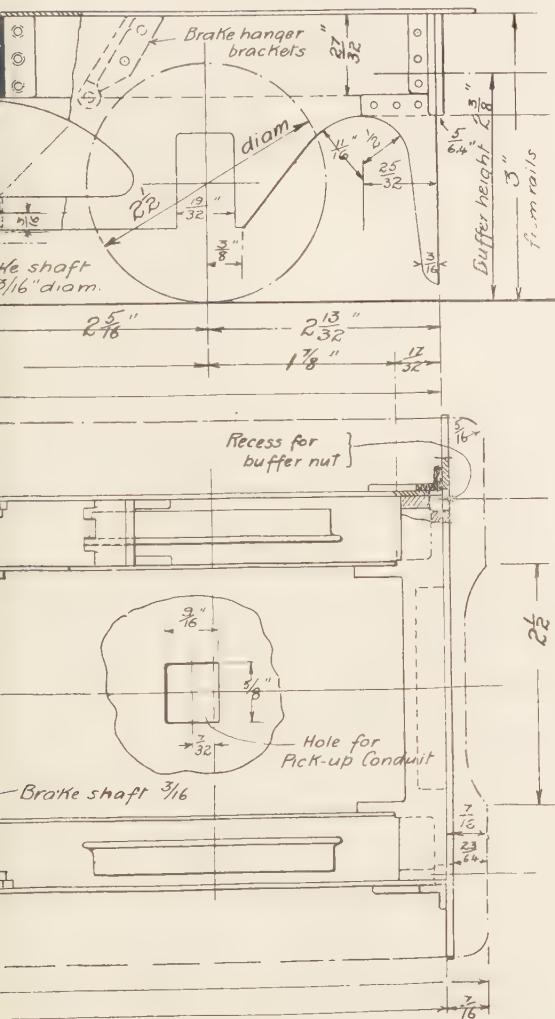


FIG. 17.—BACK BEAM.

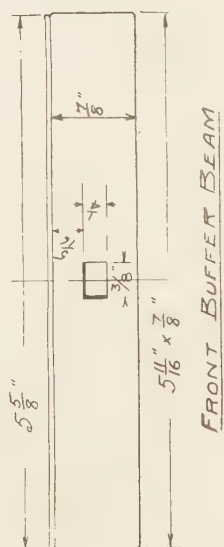
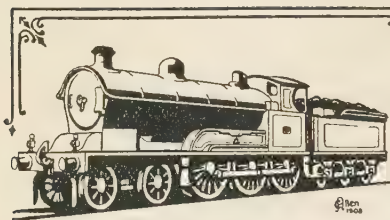


FIG. 16.

## E “PRECURSOR.”

## TENDER.



## MODEL LOCOMOTIVE CONSTRUCTION

### DESIGN FOR $3\frac{1}{4}$ " GAUGE MODEL L.N.W.R. "PRECURSOR."

(Continued from page 113.)

#### TENDER FRAMES AND TANKS.

THE tender used on the "Precursor" locomotives is an all-steel vehicle introduced by the late Mr. Geo. Whale on his taking charge of the locomotive department of the L.N.W.R. in 1903. Previously the underframes of L.N.W.R. tenders were made of timber.

The new tenders are arranged to carry 3,000 gallons of water and five tons of coal, and have six wheels of the standard diameter of 3' 9". The tanks of the, until lately, standard L.N.W.R. type have central coal space with water wings on each side, as shown in the plan view.\* The main frames are slotted, with openings of the same general shape as employed on N.E.R., M.R. and other tenders. The main frames are made of mild steel, and where model water-pick-ups and hand brakes are fitted (as in the model illustrated in our December issue) they are double one pair of plain narrow plates inside the wheels, and the other outside. The bracket for the brake-shaft is shaped to act as a strut to resist the pressure of the hand wheel screw, which, in the original, is above the level of the footplate, on the side of the right-hand water wing.

The buffer-beams are castings, and serve to secure the inside and outside frame plates. The brake hanger brackets are fitted between the two sets of frames, and act as distance-pieces. The brake shaft has an arm which carries the swivel nut and two small arms or "peckers" which engage in a space made by fixing blocks in the pull rods of the brake gear. This is a modification (or modellification) of the device used in the prototype, in which the short arms of the brake shaft are coupled by a short link to the back of the wooden brake block strap. The water filler is sufficiently large to house the curved top of the uptake tube of the water-pick-up apparatus.

In the model above referred to the water was carried in the rear portion of the tanks—behind the coal well—and two separate spirit fuel tanks were arranged in the side wings. These were made to feed the independent troughs of the spirit lamp. By this system the intensity of the fire can be regulated, the wicks being divided into two groups and coupled to each of the separate reservoirs. The respective fires under light load and full power can thus be made to any particular proportion. The regulating handles were modelled to represent the injector feed handles of the prototype, and occupied the same relative position.

\* The new tenders as fitted to Mr. Bowen Cooke's locomotives of the "George the Fifth" class carry the coal on the top of the water-tanks.



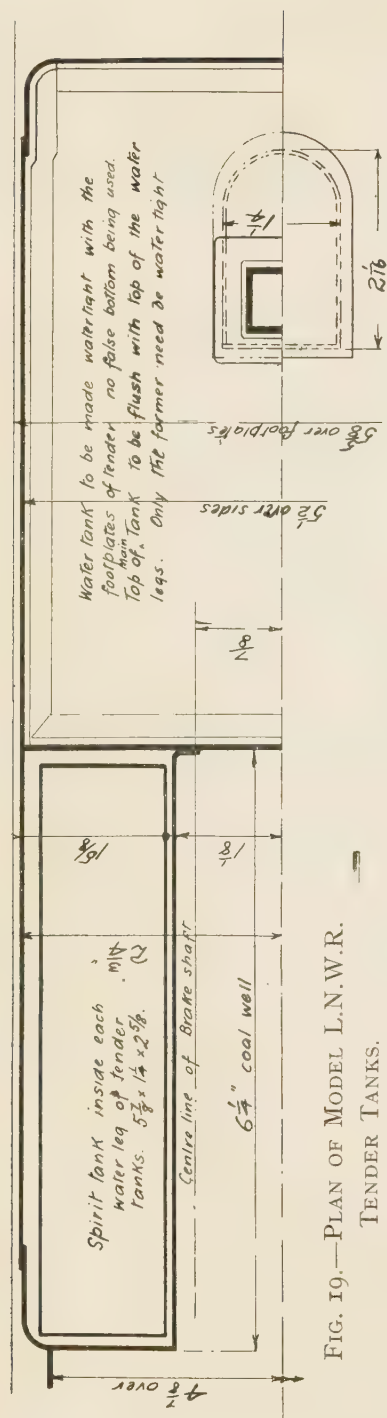


FIG. 19.—PLAN OF MODEL L.N.W.R. TENDER TANKS.

To strengthen the main frames laterally, cross stretcher-plates are arranged at the top and the bottom of the frames between each pair of wheels. The steps are separate fitments, as in the original. The hornblocks are castings, and are riveted to the main frames. The axlesboxes are of exact scale design (in outward appearance, of course) and have the proper vertical movement in the horns, the springs being castings and having spiral springs concealed in the buckle.

The footplate at the back, it will be noticed, extends comparatively much farther out beyond the buffer-beam than usual. This is a characteristic of L.N.W.R. tenders.

The water-pick-up is operated by a hand wheel on the opposite wall of the coal space to the hand brake. The tool boxes are fixed on the tops of the water wings near the front of the tender.

THE END.

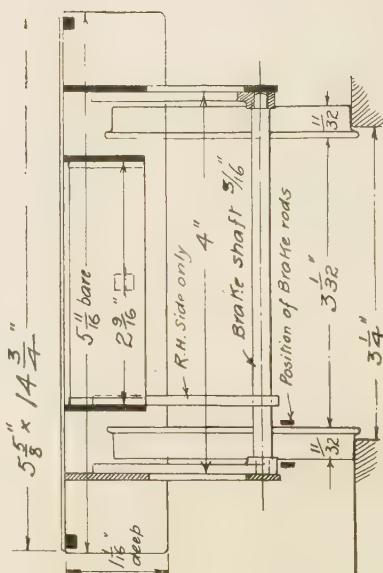
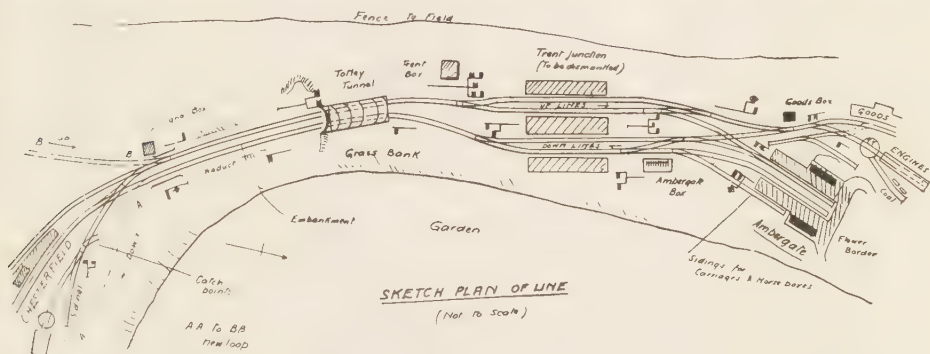


FIG. 20.—SECTION OF UNDER FRAMES NEAR BRAKE-SHAFT.



## A HOME-MADE MODEL RAILWAY.

WHEN this railway was first begun, model-making, so far as railways were concerned, was decidedly in the crude stage. Neither rolling stock nor accessories (which from their appearance usually seemed to be of German origin) bore any close likeness to the real thing, even though railways have been a familiar sight in England as long as anyone of ordinary longevity can remember, and every locomotive as a matter of course had "brass fittings" as its chief attraction, and "Express" emblazoned on its boiler. This fact, coupled with the consideration that the line, for lack of indoor space, had to be an outdoor one, and warranted to stand the test of all weathers without attention during the owners' absence at school and Cambridge, &c., was the chief reason why it has all along been constructed, roughly but strongly, of such metals as are cheap, tough and easily replaced when worn out. The old kind of tin rail was out of the question: it was so light and flimsy that it



PLAN OF MR. W. W. MORRICE'S OUTDOOR MODEL RAILWAY.

required a permanent foundation, and even then would soon have rusted away. So the material used almost from the start for permanent way has been 1 iron, about  $\frac{1}{4}$ "  $\times$   $\frac{1}{2}$ ", screwed down to stout "batten" sleepers by means of galvanised washers projecting over the base of the rail. This makes a very heavy and durable, though of course rather springless, road, and the sleepers rest on the earth except at the points, when they are screwed to battens placed lengthwise. The road-bed is made up for some 4" to 6" in depth with stones and clinkers, which drain it excellently, and ballasted with small granite chippings. There are at present no fishplates, the several pairs of metals meeting on a common sleeper. The great advantage of this form of fastening down is that the line can easily be lifted for alteration, or the gauge adjusted.

The signals and signalboxes, bridges, stations, etc., are all made out of tin, wood and so forth by the owners; all signals are worked from the cabins, but the points are moved from separate boxes, and it need hardly be added, as usual in a home-made railway, inter-locking is unknown. The largest signalbox—there are four altogether—contains sixteen levers.

The points are connected to the cabins by iron rods and angle joints and are so actuated up to distances of four to five feet.

The system is double throughout, and for some 9 or 10 yards there are four roads, two "down" on one side and two "up" on the other: as at present arranged, two of these are only available for goods, as they have no direct junctions with the northern terminus. There was till recently a branch line, but owing to the severity of its gradient it has been removed, and a new goods yard installed with the materials. There is an engine shed and turntable at either end of the line, but it is intended shortly to construct a semi-circular loop with the new "Lowko" rails at the southern end so as to



VIEWS ON MR.  
W.W. MORRICE'S  
OUTDOOR  
MODEL  
RAILWAY :

(a) TRENT  
JUNCTION  
STATION.



(b) MODEL  
TRAIN  
PASSING  
UNDER  
FOOTBRIDGE.

double the run of the train.\* "Trent Junction," the exchange station for the branch on the quadruple portion of the line, is now useless, and is being dismantled. The southern terminus, "Chesterfield," has a single island platform.\* There is a short tunnel about half-way, which is perhaps as

\*Since the above article was written this loop has been constructed, and Chesterfield Station re-built with two platforms. The engine has also been completed and works excellently, though the burner is given to choking occasionally.

realistic as most tunnels are (which is not saying much), and is useful as an extra carriage-shed in emergency.

It is believed that the signalling arrangements throughout are fairly complete: "advance starters" and shunting signals are installed, as well as the usual "distant," "homes," and "starters," and small point signals are now being fitted. The "distant" arms are situated at from 18 to 24 feet from the "homes," and are of course controlled by the same box as the latter.

The chief drawback of the line is that it was originally laid out in the  $2\frac{3}{4}$ " (= in this case  $2\frac{1}{2}$ " gauge)—sometimes known as the "3" gauge," for some peculiar reason—and this gauge is now little used (*Model Railways Handbook* tells us) in model railway circles. The alteration of such a length of line—some 45 yards, single measurement—with so many points and crossings, is no light task, but if a change is made (the points, of course, are the difficulty), the  $2\frac{1}{2}$ " gauge will probably be the one chosen.



MR. W. W. MORRICE'S  
OUTDOOR MODEL  
RAILWAY:  
A VIEW OF "TOTLEY"  
TUNNEL.

Coming lastly to the rolling stock, it is very unpretentious. A "saloon" carriage was bought some eight or nine years ago, and its bogies are still in excellent condition on one of the two otherwise home-made coaches: the other coach has more modern bogies, but the wheels are rather too small and bump at the crossings. There are various "10-ton" trucks; biscuit-boxes make bodies of almost exactly the right size. The only proper locomotive the railway has ever possessed was a L. & S.W.R. No. 593 four-coupled outside-cylinder (4-4 0). This engine never did well for some reason—it seemed to be wrongly "timed," and dry steam could not be obtained, and its wheels and frame (the latter strengthened) are now used for a rather original engine, which has not yet taken final shape, though it did nearly ten miles an hour on the line (light) when running its trials. It consists of a Stuart-Turner high-revolution engine (two cylinders single-acting  $\frac{3}{4}$  bore,  $\frac{3}{4}$  stroke), as sold for model boats, driving the front pair of driving wheels by means of bevels. The boiler is of the Lancashire type made in a friend's workshop, consisting of a copper shell with a smaller

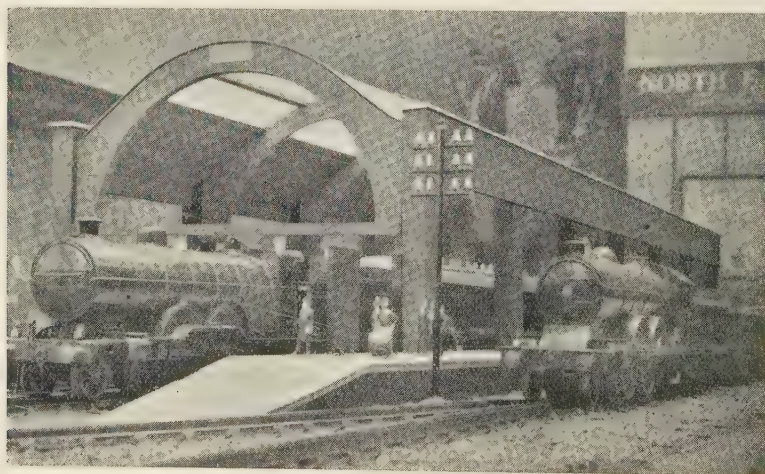


copper tube forming a flue, open at one end and opening into the smokebox at the other, with twelve cross-tubes; the firing is by means of a petrol blow-lamp. The steam is superheated by passing the steam-pipe backwards along the boiler through the smokebox. Steam is taken at 30lbs., and the engine is designed to do 12 miles an hour with that pressure on the level; but it will probably be geared down, as a maximum of 6 miles per hour is quite enough to handle easily, and hauling-power is required rather than speed. It will certainly be of exceptional power for its size and gauge, and should haul any load, as the line is now practically level throughout. It is hoped that it will be possible to make it resemble a modern locomotive in appearance; if so, the boiler will seem very long, as the driving-engine is being mounted on the bogie-frame, and will have in that case to be covered in by an extension of the smokebox: but long boilers are now the rule rather than the exception. If this object cannot be attained, the whole locomotive will be covered in, and will resemble a rail-motor.

NOTE.—Any apparent discrepancies in the photographs accompanying the description are to be explained by the fact that they were taken at different periods of the line's existence, and slight remodellings have been frequent of late.

W. W. MORRICE.

### THE G.N.R. MODEL AT BRUSSELS.



THE G.N.R. MODEL LEAVING "KING'S CROSS."

MOST all of our subscribers have by the time they read this issue, no doubt heard of the disastrous fire at Brussels Exhibition, but may not know that the above model was completely destroyed. When the attendant went a day or so afterwards to see if he could find anything of the model railway



intact, he reported that he could not find the place, let alone the model. The photographs were taken about a month ago, and show the rolling stock and



(a) MODEL G.N.R. AND N.B.R. LOCOS NEAR SIGNALBOX.

(b) MODEL G.N.R. RUNNING OUT OF KING'S CROSS.

stations excellently. A plan of the model will be found in our issue of September last year. The recent additions included new goods rolling stock, and also the turntable fitted with electrical, instead of hand-operated mechanism.

### OVERHEARD AT THE BRUSSELS EXHIBITION.

A FRENCHMAN and a German, both engineers, were walking round the Exhibition grounds, when the conversation turned on the merits of their respective languages. The Frenchman claimed that his language was more expressive. The German said that as regards locomotive matters it certainly was not, and said, for instance he could describe the working of a locomotive by figures only. At this the Frenchman shook his head. The German persisted, and put down on a piece of paper the following :—

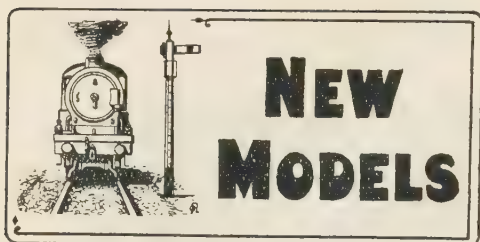
5 and 6 (fünf und sechs)—German compound locomotive leaving station.

25 (fünf und zwanzig)—locomotive getting under-way.

22 (zwei und zwanzig)—locomotive gaining speed.

1000—1000 (tausend—tausend)—the locomotive at full speed.

Those readers who speak German, and have listened attentively to the compound locomotives of the Fatherland, will appreciate this joke.



## THE LATEST IN ELECTRIC LOCOMOTIVES.

THE advantage of the No. 2 gauge is that a large range of both scale model and tin-plate stock is readily obtainable, is somewhat increased by the new model electrically-driven Great Eastern Railway locomotive illustrated in the accompanying photograph.

This model is built of castings throughout, and is fitted with an exceedingly powerful permanent magnet motor, which is geared through a single train



MODEL 2" GAUGE G.E.R. ELECTRIC LOCOMOTIVE.

to the driving wheels. The model is fitted with electric headlights, and is beautifully enamelled. Messrs. Bassett-Lowke & Co. have them in their showrooms in London, and the price, which is given in our advertising columns, is very moderate.



## NEW FISHPLATE FOR SCALE MODEL PERMANENT WAY.

THE novel fishplate which is employed in scale model permanent way, and is cast in white-metal, is being improved this season by being made out of sheet brass. This gives it a springiness which the old white-metal fishplates did not have, and which made them difficult to use more than once. The new fishplates are neater, and have the imitation heads of bolts embossed on them.



## CONSTRUCTIONAL MODEL WAGONS.

MESSRS. J. Bedington & Sons, of Northwood Street, Birmingham, announce for the forthcoming season some new constructional trucks in wood for Nos. 0 and 1 gauges, with finished wheels and axle-guards. The sets of parts for these trucks embody some entirely new features, and are produced at a very moderate cost.



are only needed six engines and three trains, a slip and a rail motor, and two goods trains—and the main line is *single*. So that with modifications, Capt. Colston's arrangement is adaptable to any line which is not continuous. I might just mention that we have found old bell indicators (*i.e.*, the pendulum movement) very useful for making electric signals; they cost 5d. each, and we have seven working at present, and of course they work at any distance off one dry battery. I have four signals and a bell working off one battery.

David Randall (Liverpool) will, as far as I can see, have to have electric brake stops by means of a treadle and solenoid, thus—



Treadles A1 A2 work stops A3 and A4 and ditto B, but the stops must only be stops in one direction, like Mr. Hunter's of some time back in *Model Railways*. Having successfully prevented any train from entering the single line, Mr. Randall must decide for himself which one will proceed. This might work all right, only without signals it is rather awkward.

Hoping this letter may be of some use.

Yours faithfully,

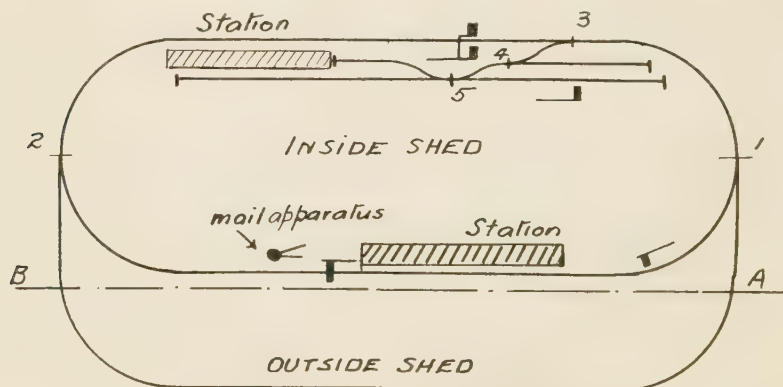
G. HERBERT KING.

#### THE AULD REEKIE MODEL RAILWAY CO.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

In your articles on model railways which have appeared in your magazine I have not noticed many from this part of the country. I do not know if



PLAN OF MR. R. A. BUCHAN'S MODEL RAILWAY.

(Dotted line A.B. is the wall of the shed.)

many people in Edinburgh go in for this form of amusement, but it is one which has interested me since boyhood. My railway is very simple in construction, but it is neat and fairly realistic in appearance. The rolling



stock used is mostly L. & N.W.R. and Caledonian, both in passenger coach stock and locomotive. The rail which is used on all straights and sidings is the new hollow section "Lowko" rail, and all switches and curves are the ordinary large radii tin-plate. The photo illustrated shows one of the stations on the Auld Reekie railway; a train is just leaving, and is being hauled by a No. 2 gauge "Lady of the Lake," the well-known single locomotive which gives great satisfaction. The main portion of this railway is in a shed in the garden, but a portion of the main line runs out into the garden and enters the shed again at another part. The mail apparatus for taking on the mails is made from a portion of an old wreath stand which I found while walking through a cemetery. This hardly sounds in common



PHOTOGRAPH OF AULD REEKIE MODEL RAILWAY.

with railways, but it lifts the mails splendidly, so that is the main thing. The rolling stock consists of 5 passenger coaches, one sleeping car, one passenger brake-van, one mail van, three locomotives (steam) and one clockwork loco.

The following plan shows the design of railway. It is 2" gauge, and is all on a raised platform about 3' 6" from the ground. The distance round the inner line is about 45 feet and the distance round, using outer line, 60 feet. Stations and shed are lit by electric light. Yours sincerely,  
PORTOBELLO, N.B. R. A. BUCHAN.

#### MODEL RAILWAY SOCIETY.

TO THE EDITORS *Model Railways and Locomotives*,

DEAR SIRS,

People whose hobby is model yacht and steamboat sailing have their model yachting clubs, and the Society of Model Engineers exists for model engineers in general, and seeing that model railways have the last few years been taken up extensively, it would be interesting if, by the medium of *Model Railways and Locomotives*, views of model railwayists could be taken by means of a post-card vote as to the desire of forming a Model Railway Society. I myself think—apart from a social point of view—that it would be very helpful, as members would be brought together personally, and

valuable hints and advice exchanged at the meetings, to the benefit of all present; no doubt, too, the Editors would also be good enough to publish accounts of meetings, and even belong to the society. If such a project should be thought worthy of taking up, I should be pleased to render my humble assistance to help it being a success.

Yours very faithfully,

16, LANHILL ROAD,  
MAIDA HILL, W.

W. R. S. SMART.

[We shall be glad to receive further suggestions on this subject.—EDITORS.]

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### ANSWERS TO CORRESPONDENTS.

H. BETTLE.—Insert an advertisement in our sales column.

E. G. H. (Rochdale).—The pictures are hardly up to our standard of reproduction. Many thanks for the attempt. We reciprocate your good wishes.

G. P. (Newcastle).—Apply to the makers of these locomotives to the Northampton office.

J. H. (Lynn).—Many thanks for article; we could not use all the photographs.

R. R. (Hartburn).—We hear that a new model mail van will make its appearance this Christmas.

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### READERS IN DIFFICULTIES.

DIFFICULTY No. 112.—BLOCK SYSTEM SECTIONS.

J. F. S. writes:—Could you tell me if every small wayside station must have a full set of signals; or is it enough simply to have a home and starter? What I mean is this: Suppose we have three stations on a given section of line

A ————— C ————— B

the centre one (C) being a small unimportant wayside station, would not the line from A to B be treated as one block section. If this is so, would station C have any signals at all?

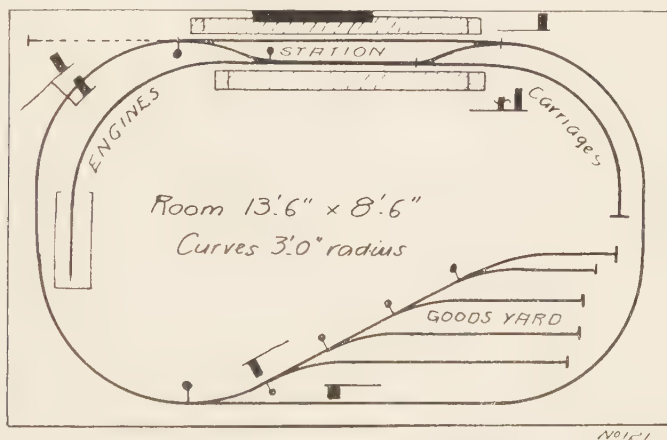
This query is a very interesting one. In the first place, the standard practice in this matter would depend on the ideas of the engineer and the amount of traffic passing over the line in question. On a line which has not many trains per hour, or day, then it is quite possible that the block section would extend from A to B. You may have noticed on a Sunday on the L.N.W.R. main line more particularly, all the signals at a small station showing line clear. This is a case where the small amount of traffic on the Sabbath renders it possible to extend the sections and therefore the signal cabins at the smaller stations are "switched out," to use the proper term, as you would propose to do with station C. In some instances two intermediate stations are temporarily eliminated from the system. It saves up-keep charges and also the wages of a man. This being a recognised practice on all our railways, there is therefore no objection to the proposal you make. The use of signals at the intermediate station is, however, a matter of choice and local conditions. A station home with distant, and a starter signal may be employed but the signals would not be controlled by the block instruments. They would be employed simply for station purposes, say, to use for stopping a train outside the station should there be any accident in the station, or should there be a siding at the station for the disposal of trucks, etc. The starter would be used for starting the trains.

In the majority of such cases, especially where the unimportant stations are on single lines, the signal frame is situated on the platform and worked by the porter. At a single-line station of this kind, not many miles from where you reside and where this answer is being written, you can very often see both the up and down signals off, when perhaps

the train due is coming in the "up" direction. However, this does not matter so long as the station-master or porter knows that the station is clear of any trucks off the platform or wagons from the siding. The driver would not enter the station if his signal was showing danger, but he does not mind both the up and down signals of a single line being "off." He knows he can trust the electric block or staff system under which he is traversing the section. Therefore the middle station (C) may not have signals, except where it is thought the station itself is better protected thereby, or where there is a siding for wagons joining the main line. In such a case the signals would all be interlocked, and would have to all show "danger" before the siding points could be moved. Of course this is not a perfect protection, as it depends on the man in charge. But he is not likely to push a truck out of the siding on to the main line and forget it entirely.

#### DIFFICULTY NO. 121.—RAILWAY PLAN.

A. L. R. (Newcastle-on-Tyne) writes:—Will you kindly give me your advice *re* laying a model railway in a room 13' 6" by 8' 6". The door is no obstacle. The gauge I would prefer is 1 $\frac{3}{4}$ ", as I like the G.W.R. "County of Northampton" steam locomotive. As it will run on a 6' circle with small bogie wheels, I think it might be possible. There is a plan of Mr. Carrs' model railway in *Model Railways and Locomotives*, August number, 1910, which I think might be suitable.



NO. 1 GAUGE MODEL RAILWAY PLAN.

You cannot apply Mr. Carr's plan if you adhere to the No. 1 gauge and the 13' 6" by 8' 6" room. One of the best plans for a room of the size mentioned is shown in our diagram herewith. In this you get a passenger station with engine and carriage sidings, and a fairly extensive goods marshalling yard. The arrangement of substructures is also not inconvenient. Of course you may alter the relative positions of the stations and sidings to suit the doorway, etc.

#### DIFFICULTY NO. 103.—LOCOMOTIVE QUERIES AND PHOTOGRAPHING MODELS.

G. S. E. & W. R. (Dulwich) write:—Would you mind answering through your columns a question or two regarding locomotives. I have often noticed with engines fitted with the vacuum brake, when they are standing still, the driver turns a handle in the cab which causes a roaring sound in the smokebox, and also steam is emitted from the chimney. Is this "blowing up the vacuum," or is it the blower working? I have not noticed it particularly in engines fitted with the Westinghouse brake, for instance the L.B. & S.C.R. locomotives. If it is only the blower, could you tell me whether "blowing up the vacuum" produces any noise in the engine.

I cannot agree with your remark that distant signals on a model railway are not needed. I think they are, in order to make the railway as realistic as possible, which ought to be the aim of every model railway owner.

I have one of the standard No. 0 G.N.R. clockwork locos on my No. 0 gauge railway, and I am very pleased with it. It will pull, at one winding, four bogie carriages, each weighing 10-ozs., over 80 feet, and this on a line full of curves (new radii). I wish a L.S.W. 4-4-0 or M.R. 4-4-0, or G.E. 4-4-0 could be introduced.

Regarding your excellent paper, I wish you could publish a few articles on the construction of clockwork model locos, or failing that, get Mr. Smart or some of your other contributors to describe in detail how they built their locos. This would be very interesting. Could any of your readers give me a few hints on photographing model railways, as those I take are always fuzzy.

The noise is due to the exhaust of the large ejector which is employed to create a vacuum in the brake system as quickly as possible and to take the brakes off. On the Great Western the uniform staff use the term "blowing up" the vacuum. A smaller ejector is used to maintain the vacuum (and keep the brake off) against possible leakages in the pipes and cylinders. In the place of the smaller ejector the G.W.R., L.N.W.R. and a few other companies employ a pump driven from the crosshead. The steam blower does not make nearly so much noise as the large vacuum ejector.

We note you do not agree with our "no distant" signal policy. It is entirely a matter of choice. From your point of view their use can of course very well be defended.

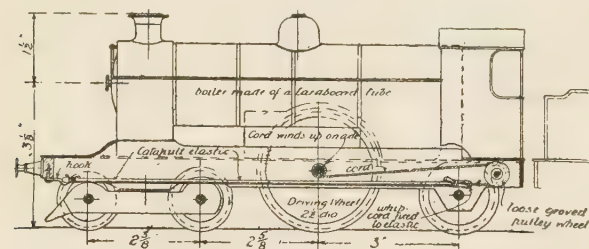
The large numbers which have to be made prevents the types of models being multiplied to any great extent. The range available is already large.

The articles you mention are being prepared, but of course we welcome anything Mr. Smart or any other reader may be able to do in this direction.

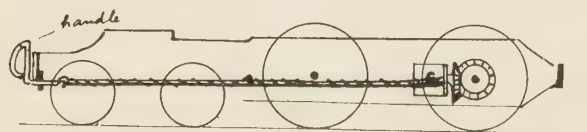
The note in our June issue, page 199, should be useful to you. The best background is a moving cloth, light grey or nearly white one.

#### DIFFICULTY No. 112.—CARDBOARD MODEL LOCOMOTIVES.

L.N. (Chelsea, S.W.) writes:—Several years ago there appeared in a publication entitled *The Boys' Herald*, an article from the pen of your Editor on the construction of cardboard model locomotives, wherein mention was made of a method of propelling the above by means of an indiarubber band. Unfortunately I did not obtain the number in which this method was described, and I now write to ask you if you will be good enough to forward me in the enclosed envelope a description of it. Wishing your excellent publication *Model Railways and Locomotives* (of which I have been a reader since the first number) every success.



MODEL SINGLE  
LOCOMOTIVE,  
WITH ELASTIC  
DRIVE.



AN ALTERNATIVE  
ARRANGEMENT.

It is beyond us to remember the date of the back issue of the journal mentioned, or to say whether you could get it, but we reproduce a copy of the drawing referred to. The engine to which it is applied, it will be seen, is a modernised model of the famous Caledonian Railway single No. 123. The elastic is tied to a cord which runs over a pulley. It is probable this arrangement could be improved by introducing gears and twisting the rubber instead of pulling it out. By making the drive to the back axle of a coupled engine and introducing bevel gears the length of run with one wind might be much increased. We are glad you are pleased with our publication.





A Monthly Journal devoted to Model Railway construction and working.

— Edited by —  
HENRY GREENLY.

Editorial and Advertisement Offices—  
MODEL RAILWAYS PRESS,  
2 & 4, Tudor Street, LONDON, E.C.

(New Series).  
Vol. II., No. 10.

OCTOBER, 1910.

### TO OUR READERS.

THE most important announcement we have to make is the change in the address and conduct of our little journal. We have for a long time past felt that the necessary expansion on independent lines had to come, and the very gratifying reception of a magazine devoted exclusively to the needs of the model locomotive enthusiast leads us to think that, considering the present strength of our position in the model railway sphere, there is ample room for development. We have been intimately connected with model locomotive and railway construction in a professional way, and as an enthusiast for over ten years. We have also had experience in real railway work in several branches, and although such experience will never reach finality, we venture to say that it has been unique. We are therefore entering our future labours with vigour, and in return ask our readers to support us in a similar manner. What is sauce for the goose is sauce for the gander.

We shall always be pleased to advise our readers on model railway subjects where the matters upon which we are questioned can be legitimately considered within our scope, and of sufficient general interest to warrant publication. We also solicit readers' opinions on the various problems the building and operating of a model railway involve.

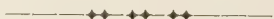
Reviewing the past, although the bulk of the work has fallen on our shoulders, we must recognise the splendid efforts of our leading contributor Mr. Cecil J. Allen. Mr. W. R. S. Smart's articles, and also those of Mr. L. Hervé, W. H. Jubb, Mr. Skelton, Mr. Hart, and numerous others have helped towards the great success of our journal; and Mr. J. A. Holder's support must also not be forgotten.

With regard to the proposed MODEL RAILWAY CLUB, we are inserting further letters, and to test the extent of the movement, we shall be obliged if all those readers who are interested will let us know whether they would attend an inaugural meeting in London. We intend to let Mr. Smart in for at least some of the secretarial work, and to cover the initial expenses and sending notices, ask those readers who would like to join to enclose a 6d. postal order in their letter to cover such outgoings.

All communications with reference to the conduct of this journal should be sent to the new office, 2 and 4, Tudor Street, London, E.C.

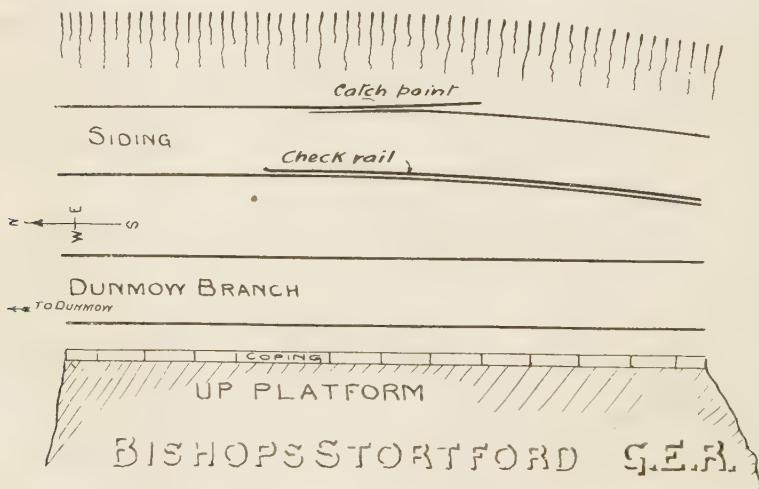
## SOCIETY OF MODEL ENGINEERS.

At a meeting at the Caxton Hall, Westminster, London, S.W., on Tuesday, 20th September, Mr. Claude Gaggero gave an interesting paper on his attempts during the past few years to obtain successfully iron castings in a home-made furnace. The paper was illustrated by lantern slides prepared by the author. Mr. Gaggero's paper was followed by a few notes by Mr. Henry Greenly, which comprised such subjects as the electrical equipment of the C.P.R. model, a new automatic reverser, and points in the design of a working  $1\frac{1}{2}$ " scale model compound locomotive (Midland No. 2631) prepared for Messrs. Stuart Turner, Ltd. The chief feature, however, was a practical demonstration of a new model "Pop" safety valve, which has been designed to entirely prevent disastrous accidents to model boilers.



### A PERMANENT WAY CURIOSITY: WHAT WOULD HAPPEN ?

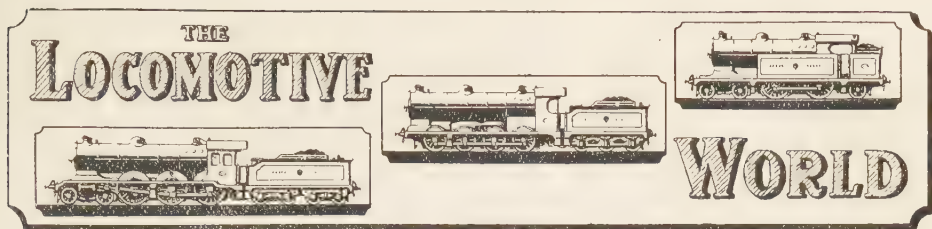
It is not often that one finds in modern railway practice such a curiosity as shewn in the adjoining sketch. This is situated at Bishops Stortford station on the G.E.R. Cambridge main line. There is an "up" and "down" main line with a platform to each. The "up" platform is an "island," having the Dunmow branch on the east side of it (the main lines here run



roughly north and south) The catch-points in question are at the south end of the "up" platform and near the south signalbox. As shewn, the catch is of the single-bladed type, and the check-rail extends some 3' beyond the tip of the blade. A runaway vehicle has therefore to either jump the blade with its left-side wheels, or the check-rail with its right-side wheels—and in the former case might not derail, but continue on its course! What do your readers think would happen?

HERNE HILL, S.E.

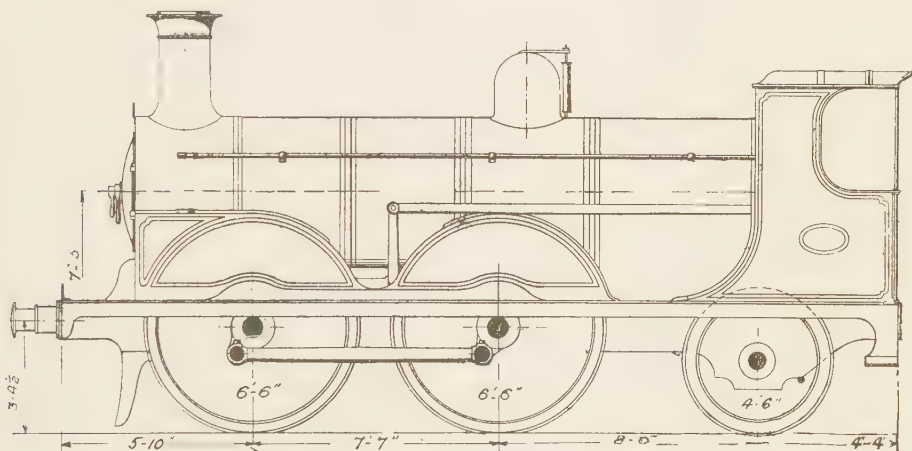
W. BARNARD HART.



## THE EXPRESS LOCOMOTIVES OF THE LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

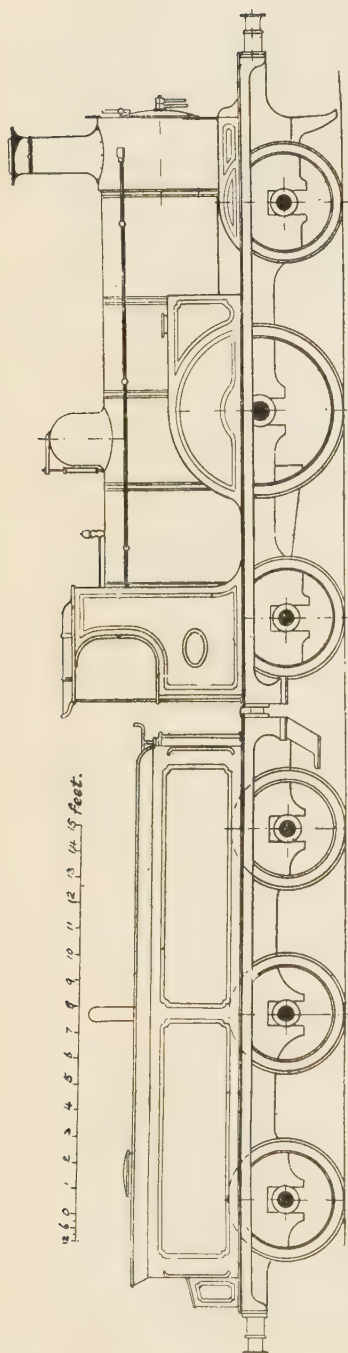
By CECIL J. ALLEN.

WE are concluding our present series of articles on the express engines of British Railways with an article describing the express locomotive practice of the London, Brighton and South Coast Railway, which, for more reasons than one, have always possessed a peculiar interest to those interested in the subject. Among these reasons the proximity of the line to London is probably



MR. STROUDLEY'S "GLADSTONE" CLASS 0-4-2 TYPE EXPRESS LOCOMOTIVE, LONDON, BRIGHTON & SOUTH COAST RAILWAY.

an important point, but the fact also that the L.B. & S.C. locomotive department has always kept well abreast of the times, while showing marked enterprise and diversity in locomotive construction, has not failed to enhance such interest. Again, those that are acquainted with the difficulties besetting fast running on lines such as the L.B. & S.C.R., or its neighbour the S.E. & C.R., will agree that the timings of many of the expresses on this line are by no means so easy in practice as they appear on paper, in consideration of the weight of the trains, the severity in places of the gradients, and the number of places where speed requires to be reduced substantially for curved portions of the line, all of which hindrances tend to a loss on schedule time. On this account the timing of one hour in force between Victoria and Brighton by several trains represents really good locomotive work, although the total distance covered is only one of  $50\frac{3}{4}$  miles.



MR. STROUDLEY'S 6' 6" SINGLES OF THE "STEPHENSON" CLASS, No. 329, LONDON,  
BRIGHTON & SOUTH COAST RAILWAY.

In consideration of the real interest afforded by L.B. & S.C locomotive practice, both past and present, we require to go back to the designs of the late Mr. Stroudley, nearly all of whose express engines are still running. He commenced his superintendence by turning out four engines of the 2-4-0 type, of which the pioneer was named "Goodwood," and which were scrapped in 1899. But the chief interest centres round his famous "singles" and "front-coupled" express engines. The first single-driver, No. 151, of the 2-2-2 type, appeared in December, 1874, and was named "Grosvenor," and, for that period of locomotive construction, was an exceptionally powerful machine. The boiler, with the largest external diameter of 4' 5" and a length in the barrel of 10' 5", had a heating surface of 1,100 sq. feet, and the firebox one of 110 sq. feet, total 1,210 sq. feet; the area of the fire-grate was 19.3 sq. feet. The working pressure was 150 lbs. per sq. inch. The cylinders were placed inside the frames, and were 17" in diameter by 24" stroke. The driving wheels had the small diameter for a "single" of 6' 9", which was, however, eminently suited to the work of the Brighton line, while the diameter of the leading and trailing wheels was, on the other hand, exceptionally large, being 4' 6"; the latter, however, was the favourite constructional practice of Mr. Stroudley's. The weight of the engine in working order was 33 tons, of which 14 tons were available for adhesion; the total wheel-base was 15' 9". The boiler was fed by two pumps from the cross-head, which were specially arranged to supply hot feed-water at high speed.

In January, 1877, an engine of the same type, but somewhat smaller, was put to work, bearing the number 325, and the name "Abergavenny." The driving wheels were reduced to 6' 6" diameter, and the cylinders to 16" diameter and 22" stroke in place of 17" x 24". The boiler, 4' 3" diameter by 10' 2" long, had a heating surface of 1,006 sq. feet only. All other dimensions, however, as also the weight in working order, remained substantially the same. After careful note of the working of these two experimental locomotives, at the close of the year 1880 Mr. Stroudley commenced to turn



out his well-known "G" class of "single-drivers," numbering in all 24, and occupying in construction until April, 1882. The larger cylinders, 17" diameter by 24" stroke, were adopted with the smaller boiler, 4' 3" in maximum external diameter, and 10' 2" long, affording in this case, however, a total of 1,184 sq. feet of heating surface; the working pressure was again 150 lbs. per sq. inch, but the grate area only 17 sq. feet. The driving wheels were 6' 6" in diameter, the leading and trailing 4' 6", and the total wheelbase 15' 11". The weight of the engine in working order was 33½ tons, of which 13½ were available for adhesion. The tender supplied was of Stroudley's standard pattern, with a capacity for 2,250 gallons of water, and 4 tons of coal, and weighing in working order about, 27½ tons. It is interesting thus to note that engine and tender together weighed less than a modern "Atlantic" locomotive alone on the same line, being only some 61 tons as against 67. The total length of engine and tender over buffers was 51'. These engines were also arranged with feed-water heating apparatus from the cylinders, the boiler being fed by pumps.

The names and numbers of the "G" class "singles" were as follows:—

|                  |                    |                    |
|------------------|--------------------|--------------------|
| 327 "Imberhorne" | 335 "Connaught"    | 343 "Wilmington"   |
| 328 "Sutherland" | 336 "Edinburgh"    | 344 "Hurstmonceux" |
| 329 "Stephenson" | 337 "Yarmouth"     | 345 "Plumpton"     |
| 330 "Newhaven"   | 338 "Bembridge"    | 346 "Alfriston"    |
| 331 "Fairlight"  | 339 "London"       | 347 "Dallington"   |
| 332 "Shanklin"   | 340 "Medina"       | 348 "Lullington"   |
| 333 "Ventnor"    | 341 "Parkhurst"    | 349 "Albany"       |
| 334 "Petworth"   | 342 "St. Lawrence" | 350 "Southbourne"  |

No. 151 "Grosvenor" and 325 "Abergavenny" were afterwards added to class "G." Among historic events in which these engines participated may be mentioned the first through run from Victoria to Portsmouth, on which the 87 miles were covered in 110 minutes. No. 329 "Stephenson" was sent to Newcastle for the Stephenson Centenary in 1881, and ran in the procession of locomotives at Wylam.

Meanwhile in 1876, having experimented with some smaller 0-4-2 type engines intended for mixed traffic service, Mr. Stroudley produced the first of his famous 0-4-2 type express engines. It was, of course, predicted that the large leading wheels would throw these engines off the line, but a few weeks' working was sufficient to convince the critics of the error of such an opinion. There were obvious advantages in so designing a six-wheeled express engine, chief among which were the freedom obtained in arranging the firebox, which is altogether limited in form in the case of the more usual 2-4-0 type engine. The cylinders were placed above the front coupled axle at an inclination of 1 in 11½, and drive on to the rear coupled axle. They were 17½" diameter by 26" stroke. The boiler and firebox were practically identical with those of the "singles" last described. The coupled wheels were 6' 6" in diameter, the trailing wheels 4' 6", and the total wheelbase 15' 7". The weight of the engine in working order was 36 tons, of which the exceptionally large proportion of 28 tons, or 78 per cent, rested on the driving wheels.

(To be continued.)



## A MODEL RAILWAY IN AMERICA.

BY JOHN HOLLIS (Lynn, Mass., U.S.A.).

THIS railway, the building and running of which have given the greatest pleasure, was originally of the portable variety, with No. 0 gauge tin-plate rails, three small clockwork locomotives and about a dozen cars of the toy-shop order. A station and freight-house were soon installed, and the track



VIEWS ON AMERICAN READERS MODEL RAILWAY.

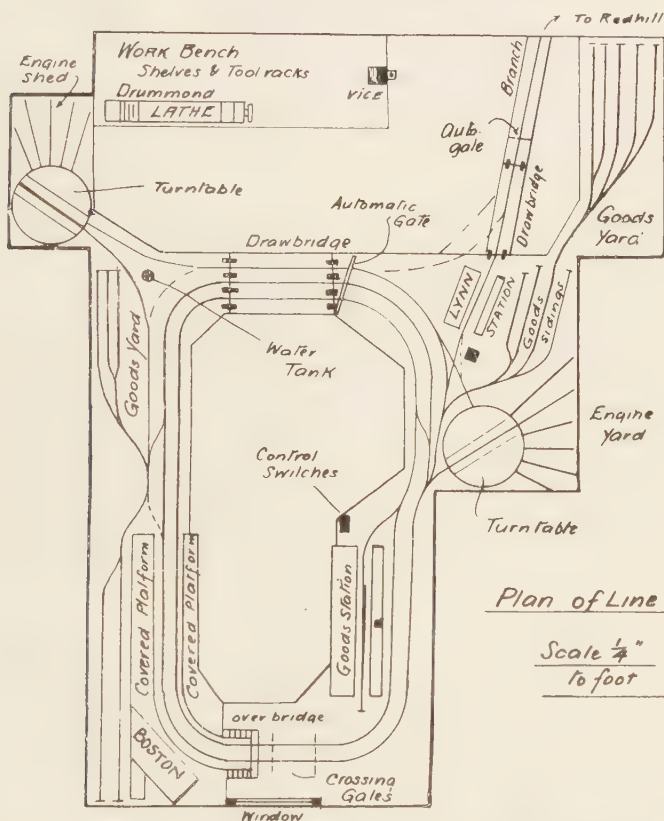
was gradually extended until it reached such proportions that it was no small task to lay it out and put it away, in addition to which, the continual stooping, due to the line being on the floor, was very unpleasant.

At about the time that the "manager" was considering the possibility of obtaining a permanent location for the line (January, 1908), he happened to see, in a small magazine published in Boston, an advertisement of *Model Railways*. First the book was obtained, and then a copy of one of the firm's catalogue advertising therein, and these opened up an entirely new field, as the model railway goods obtainable in America are very limited, both in quality and variety.

A room in the attic was now taken for the exclusive use of the line, and a shelf or bench was built entirely around it, so as to provide for a continuous track. A drawbridge, mounted on hinges, was placed at the entrance to the enclosed space. The shelf is 2' 2" from the floor, and varies in width from 2' to 3' 7", according to the space available. This height is not quite enough if the line were to be used entirely by adults, but taking into account the

height of the "manager's" two little boys, who are particularly interested in the line and its working, it is about right.

The track was now laid on this structure. At first the old tin rails, fastened down with hook nails, were used, and formed simply a single track around the circuit, with suitable sidings. Two turntables were also fitted, the pits for which were formed by sawing out a circular opening about 18" in diameter in the shelf, and then screwing boards to the under side of the shelf, so as to extend across the aperture. The table, made of a board the same thickness as the shelf, was then mounted on a steel wire nail as a pivot. After a while



a sample of small scale permanent way was tried, with such good results that the main line is now double tracked all the way around, and is laid entirely with this excellent material. All switches entering the main are also made up from the sets of small scale parts.

After this had been done, an electric locomotive was decided on, and all of the main line, and such sidings as required it, were fitted with a third central rail to conduct the current. This is supplied by two automobile ignition accumulators, one of six volts, and the other of two volts., so connected that either six or eight volts can be delivered to the track.

Quite recently a branch has been built, which, leaving the main line and striking out boldly "across country" into the hallway, passes a way station, and has a terminus on a large table, the legs of which have been

shortened to make it the same height as the main system. This line, which is single tracked, is also fitted with the central rail for electric traction.

The stations are four in number, as shown on the plan; the principal one is named "Boston," that one at the junction of the main line and branch "Lynn," the way station on the branch "Red Hill," and the terminus of the branch "Northampton." "Boston" and "Red Hill" stations are home-made and built of wood, and "Boston" station has a tower containing a working clock, which may be seen in the photograph. The others are ordinary tin-plate stations. There is also a freight station, fitted with a crane and platforms. The stations are all equipped with the standard station staff sets, which add very much to their appearance. The photographs, which, owing to the arrangement of the windows, had to be taken by flashlight, do not show these as well as might be wished, but by looking closely they may be seen, as well as the engine-driver and fireman on several of the locomotives.

The locomotive stock is as follows:—

| Clockwork :                          | Electric :                       |
|--------------------------------------|----------------------------------|
| "New York Central" 4-4-0 type.       | G.N.R. "Atlantic" type passenger |
| L.&N.W.R. 4-4-2 express tank engine. | express engine.                  |
| "Peckett" 0-4-0 saddle tank engine.  | L. & N.W.R. 4-4-2 express tank   |
| Rack rail mountain locomotive.       | engine.                          |
| G.N.R. 0-4-0 shunting engine.        |                                  |

These locomotives, which have given the greatest satisfaction, are all reversible, except the rack rail engine: the two electric locomotives may be reversed from the track. Any one of the three clockwork engines first mentioned, or the "Atlantic" electric locomotive, will take a train of four eight-wheeled scale coaches at a speed of about two miles per hour, which speed could not be exceeded without danger of overturning at the curves. The electric tank engine will take an equal load, but is not quite so fast. The outer main track, which is used for fast running on account of the easier curves, is 30' 2" in circumference, and the minimum curve is 2' radius. The inner main track is 27' 9" in circumference, and has a minimum curve of 1' 9" radius.

The passenger stock is made up as follows:—

|                                  |                                  |
|----------------------------------|----------------------------------|
| Three G.W.R. passenger coaches.  | One L. & N.W.R. brake-van.       |
| One G.W.R. brake-van.            | One L. & S.W.R. passenger coach. |
| One L. & N.W.R. passenger coach. | One L. & S.W.R. brake-van.       |

The goods stock consists of about fifty vehicles, most of which are the new scale wagons. At least one example of nearly every type made for the No. 0 gauge is included. Of the others, some were purchased here, and the rest were built in the "company's shops."

The running of the locomotives depends very much on the condition of the rails, which require cleaning quite often. This affects more particularly the length of run of the clockwork engines, which varies from 120' to 140' with the train referred to above, although the "New York Central" engine has done 165 feet with the rails freshly cleaned, and the "Peckett" engine with a light train will run about 200 feet. Kerosene, applied by means of a rag, is very effective in removing the dirt from the rails.

Besides the railway, the room contains a fairly complete workshop. The tools comprise a Drummond 4-inch Precision lathe, a foot-power scroll saw and wood turning lathe combined, taps and dies, hand drill, vice, and a good variety of tools for working both in wood and metal. Since writing the above, a clockwork L. & N.W.R. "Precursor" locomotive has been received.

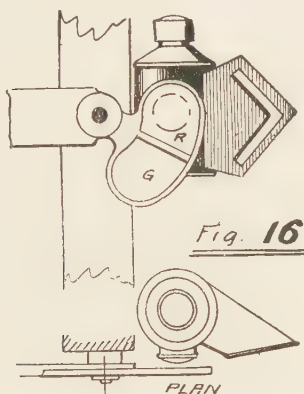
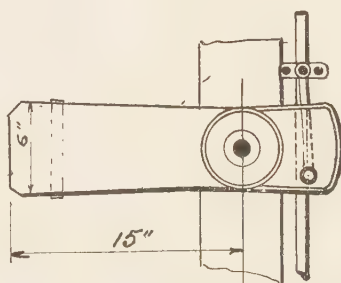
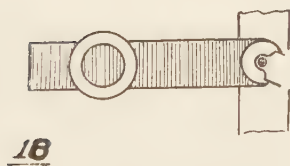




## III. THE GREAT EASTERN RAILWAY.

*(Continued from page 285).*

The distant signals are identical with the home signals in design, and have the ordinary straight white-and-black stripes painted on the arms. All distant signals on the Enfield town, Palace Gates and Chingford branches in the London suburban district are fitted with the Coligny-Welch patent

Fig. 16Fig. 1718192021

lamp (Fig. 16), whereby a white fishtail is shown at night against the light, this being done by means of a simple arrangement of mirrors inside the lamp. In the London district, also, all the signals carry "repeating" arms (Fig. 17) lower on the post, moving in conjunction with the main upper arms, for the

use of men<sup>f</sup> fog-signalling on the line during thick weather. The value of such a provision as this will be evident when it is mentioned that on the G.E.R., in the course of one foggy day, as much as £100 will be spent on fog-signals, which, at a value of 3d. each, represents a total of some 30,000 of this type of miniature infernal machine.

For giving admission to reception roads—that is, sidings entered through facing points, or for giving permission to move from sidings or reception roads on to the main line, a shorter arm is used, on which is fixed a small metal ring painted white (Fig. 18). The outside diameter of the ring is very little more than the width of the arm, a marked contrast to the practice obtaining on, say, the L. & N.W.R., where the ring has a diameter equal to almost twice the width of the arm, and is painted black, encircling the regulation white stripe. This type of arm is usually shorter than that of the ordinary home or distant signal, but occasionally, when in position on signal gantries, is made of the same length for the sake of appearance. For giving a “draw ahead” indication, a peculiar arm in the form of a cross is employed; the red and green lights also showing in the form of a cross by blacking out portions of the spectacle. Ordinary shunting indications are given entirely by means of ground discs. The fittings to the posts are somewhat varied in character, the variety being specially noticeable in the case of finials. The wooden ball and spike shown in the illustration has given place recently to a metal inverted cup and spike (Fig. 20) of more artistic design. The painted white stripe in the suburban district, where there are two or more sets of roads, gives place to white letters, indicating the road to which the signal is intended to apply, such as “T” for “through” lines, “L” for “local,” “S” for “suburban,” “TL” for “through” to “local” cross-over roads, &c. The elaborate lettering in the district round Stratford provides the casual observer with an afternoon’s amusement in deciphering the various signs.

(To be continued.)

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### MODEL RAILWAYMAN'S BOOKSHELF.

*Our Home Railways*; by W. J. Gordon. In twelve monthly parts, 9d. each nett. (Frederick Warne & Co., London.)

PART I.—THE GREAT WESTERN. This new series of books is intended to give the general public a better idea of leading features of our great railways. The parts are each devoted to one particular railway, leading off with the Great Western, and comprise at least one coloured plate of a representative locomotive and of a standard carriage. The crests of the companies in colour are also included. The other pictures are of general interest—carriages, locomotives, stations, express trains, bridges. The reading matter is couched in a popular style, and is for the larger part historical.

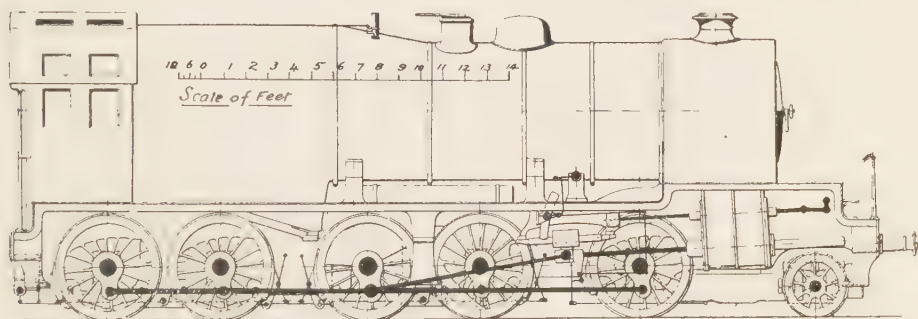
PART II.—THE MIDLAND RAILWAY. The locomotive chosen for the coloured plate given with this part is one of the No. 1000 type of Deeley compounds. The other pictures likely to interest our readers are those illustrating the new electric trains at Heysham, a Midland Railway P.O. van, a special bogie truck for carrying heavy guns, and the very ornate tunnel entrances at Redhill, near Trent.

## LOCOMOTIVES AT THE BRUSSELS EXHIBITION.

*Specially written for Model Railways by L. HERVE.*

*(Continued from page 293).*

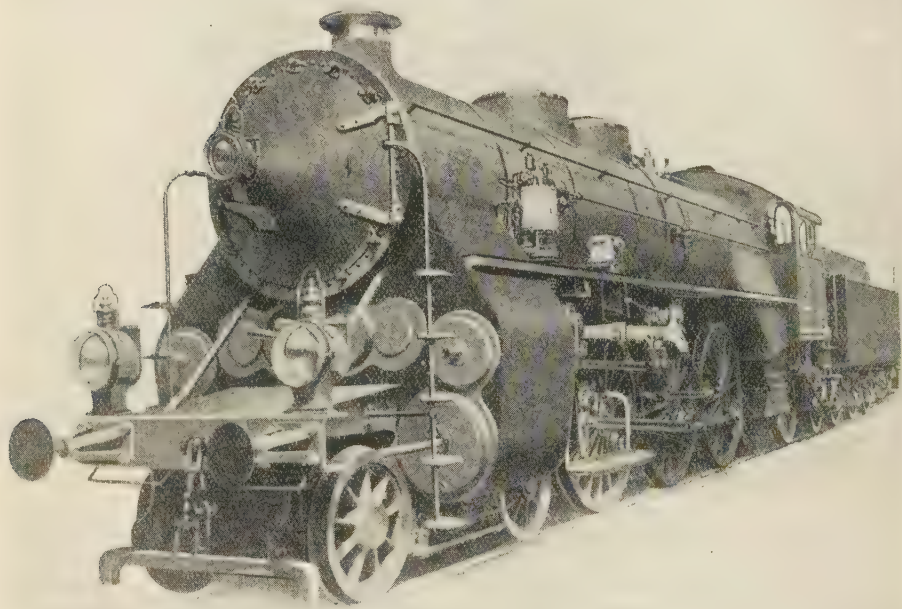
The most remarkable locomotive in the section, if not in the whole hall, is a brand-new production of the Nord Railway, built by Messrs. Schneider, of Le Creusot Works and fame; it is a 4-4-4 express passenger engine, a four-cylinder compound of the de Glehn type, the most interesting point of which is the huge grate area and firebox of the water-tube type. The boiler barrel proper ceases at the rear tube plate, and a drum, of small diameter, is riveted to it above the top row of tubes, extending to the back of the locomotive: over the frames, on either side, two small drums are fixed, parallel to the upper drum, and this upper one is connected to the two lower ones by a large number of small tubes (water-tubes, of course) somewhat on the same



BELGIAN 10-COUPLED 4-CYLINDER GOODS LOCOMOTIVE.

principle as the well-known Yarrow water-tube marine boiler. The grate finishes before the ends of the drums, so that a bridge is built across to hold the fire, and the space beyond, till the tube-plate forms a combustion chamber in which more water-tubes are led, so as to lie across the path of the hot gases. A system of electric lights is fitted in the firebox, for Exhibition purposes, so as to show to the public the details of this fiery cavern. A remarkably high working pressure is used—256lbs. to the sq. inch, and no doubt that an ordinary firebox would give considerable trouble to keep in order under these conditions; but it may also be questioned whether these hosts of tubes, bent into a great variety of shapes, may keep steam-tight without constant attention. The locomotive, up till now, has only been running experimentally, but has proved its power on many runs, notably on a run to the Belgian frontier from Paris, where the Survilliers bank, 5 miles out of town and extending 15 miles, at 1 in 200, is encountered. On the 5th January, present year, this locomotive ran up the bank with a 328 ton train at an average of 100 kilometres (62.13 miles) an hour, the speed varying between 95 kil. (59 miles) and 110 kil. (68.34 miles), the locomotive weighing 77 tons and the tender 50, we shall leave it to our mathematically disposed readers to work out the horse-power, etc.

The dimensions are the following:—Heating surface—smoke-tubes 2,373.54 sq. feet, water-tubes and drums 1,033.37 sq. feet—total 3,406.91 sq. feet; grate area 38 sq. feet; cylinders, H.P. diameter 13.38", L.P. diameter 22.04", common stroke 25.19", and drivers 6' 6.87". But still this locomotive apparently does not come up to the requirements of the engineers, and Messrs. Schneider are engaged in the construction of a formidable 4-6-4 engine, the plans of which are exhibited; this monster will have a total heating surface of 3,760.5 sq. feet, with a super-heater measuring 667.38 sq. feet, a grate area of 46 sq. feet, but only a pressure of 227.56 lbs., the cylinder and driving wheel dimensions remaining the same. This locomotive is also



FRONT VIEW OF "MAFFEI" PACIFIC.

fitted with the water-tube arrangement, but more complicated, and we understand that a similar locomotive, but with an ordinary firebox, is being constructed at the Hellemes Works of the Nord Co., to be pitted against it.

We may perhaps be permitted to open a parenthesis here and muse "some," revolving in our minds whether these colossi are really paying investments, and whether, as our old patriarch, the late Mr. Webb, was wont to advocate, double-heading by two locomotives of normal dimensions and power is not the solution to the difficulty; there is, of course, the drawback of irregular moments and motions between the two locomotives and extra possible chances of derailment at high speeds, but the devising of special coupling arrangements between engines and tenders does not seem an im-



possible feat, and many important advantages may be gained. That, in some obscure way, this arrangement represents the general trend of thought in English locomotive circles seems to be borne out by the fact that England has never taken very kindly to huge affairs, as the Continent and America, our locomotives being but feeble effusions next to the Belgian, French and German products, in spite of the fact that our good standard lines can stand a heavier load than most of their Continental *confrères*.

We leave this question to be answered by duly qualified oracles, and get back to the "osses." The Nord Railway exhibit also one of their standard 4-6-0 four-cylinder express passenger engines, similar to their well-known "Atlantics," and constructed two years ago; these engines take duty with the "Atlantics," and though perhaps not capable of achieving quite such high speeds, are none the less powerful and swift. They have driving wheels 5.74 feet in diameter; cylinders, H.P. 13.78" diameter, L.P. 21.65" diameter, with a common stroke of 25.19"; the L.P. cylinders are inside, under the smokebox, and the H.P. between the trailing bogie wheels and the leading

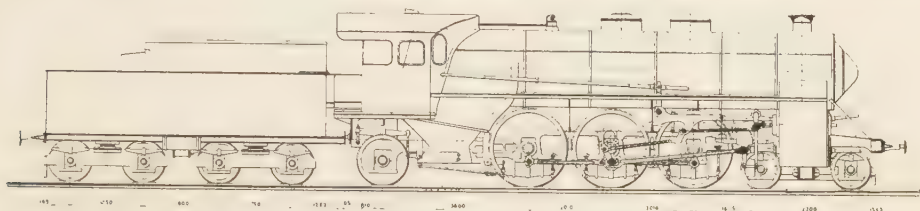


DIAGRAM OF MESSRS. MAFFEI'S SUPERHEATED 4-CYLINDER  
COMPOUND "PACIFIC" LOCOMOTIVE.

coupled drivers. Four Walschaert motions are used with separate reversing rods for H.P. and L.P. These Nord locomotives are all provided with duplex regulator handles on the same spindle, one for the ordinary regulator to H.P. cylinders, and one working an auxiliary small regulator placed outside the back of the firebox for admitting live steam to the L.P. cylinders. The heating surface of the 4-6-0 engines is 2,368.14 sq. feet, grate area 29.7 sq. feet, with a working pressure of 227.56lbs. to the sq. inch.

Two interesting "Pacific" locomotives exhibited respectively by the Paris-Orleans Railway Co. and the State Railway Administration well repay close inspection, embodying, as they do, the latest standard French practice; they are both compounded on the four-cylinder de Glehn system, which, in passing, holds the field exclusively in France. Both locomotives are provided with the wide firebox with Belpaire tops to them; both also have the back of the firebox sloping, the outer box, however, regaining the perpendicular when over the top of the inner box, so as to facilitate the placing of the longitudinal boiler-stays. Their general dimensions are very similar, and their driving wheels are both 6' 1" in diameter; in both cases the pressure is 227.56lbs. to the sq. inch; the P.O. engine has a Schmidt super-heater adapted to it, whereas the State engine has not.

The Est Co. is represented by a 4-6-0 four-cylinder compound and superheated locomotive slightly more powerful than the Nord specimen alluded to higher. The P.L.M., though having some "Pacifiques" also on the road, nevertheless sent a 4-8-0 goods locomotive, also a de Glehn four-cylinder compound. This engine recalls a little, by its short boiler, the rather

uncouth appearance of the Belgian "Pacific." The inside H.P. cylinders, almost in line with the L.P. out, drive the leading coupled axle, whilst the L.P. drive the second one. It cannot by any means be said that this is a pretty locomotive, though the workmanship and material are excellent in every way. The cab is of the wind-cutter type, favoured by several French lines, and as to the inside, the sight which greets the visitor's gaze when on the footplate, is a bewildering mass of handles and pipes, which, to manipulate with comfort and assurance, say, at night, requires a life-long practice and the memory of an encyclopædia. As an instance of what is advanced, it may be mentioned that on the Co.'s drawing, the catalogue of the various handles, taps, cocks, registers, etc., consists of exactly 52 articles. The drivers are no doubt captured very young and sent to a penal settlement to thoroughly digest this cumbersome mass of information and have their spirits thoroughly crushed. How on earth these machines are kept working is a mystery deeper than Creation itself, and which, in a similar way, is best left alone. When an accident happens in France, or Germany, for the matter of that, we shall say, alluding to the driver: Poor fellow! He was trying to think what valve No. 49 was, at what point of the compass it lay, and what he could do with it when he had found it! Poor fellow!

The Midi Co. also sent a fine "Pacific" loco on the same lines as all the other French dittoes, and equally well finished, well built, and as well provided with as many complications to the square inch as any other.

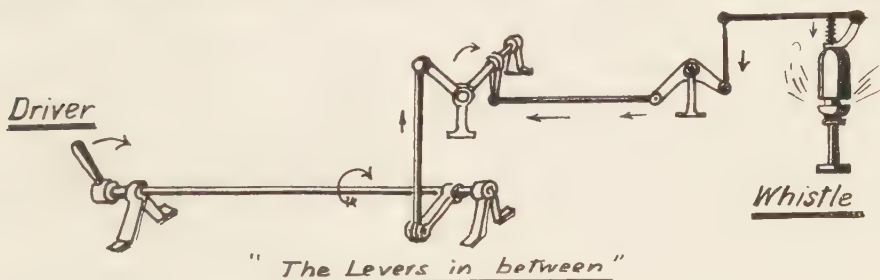
We now turn to the German section, which contains also a fine array of green locomotives and red wheels. With the exception of Maffei's "Pacific" and an "Atlantic" by the Hanoversche Works, compounding seems to be given up by Teutonic engineers. The show-piece is, of course, the "Pacific" of Maffei's build just mentioned. To the unprejudiced eye, it is merely a Yankee locomotive, only, of course, much better built, designed and finished. With its bar framing and ostentatiously apparent cylinders and piston-valves, running board seven feet up in the air, and firebox the size of a pantechicon, the impression of exaggeration started by the designs of the French 4-6-4 affair is accentuated by the actual "living" object standing there with its steel muscles and tubular "inside." The L.P. cylinders with piston-valves above are outside, horizontal, and drive the middle coupled wheels; the H.P. inside with their valves are very inclined, and drive also the middle axle, reaching for that over the leading coupled. Two sets of outside Walschaert's motion drive the four piston-valves; the firebox is of the wide type, the bar framing passing through the ashpan, the whole thing being on the "kolossal" scale. Let us hope that the drivers' wages are on the same magnificent footing, and let us pass on to the Hanoversche machine, an "Atlantic," the four cylinders (compound) being in line, and driving the leading coupled axle, like the N.E.R. four-cylinder compounds. This locomotive is fitted with the Lenz poppet valves, four to each cylinder, driven by Walschaert's valve motion, and also Schmidt's super-heated, like the "Pacific." This is a fairly complicated machine, well provided with a bewildering variety of the valve and tap-maker's art. The way the whistle is manipulated is a fine specimen of circumlocution and quite a poem in its way. The reader may judge by the following rough sketch. If any of our readers can think of anything better, no doubt the Editor would offer him a handsome presentation—or, perhaps, ring up the police!

Happily, we come across some soberer locomotives, for instance a 4-6-0. simple, outside cylinder, mixed traffic engine built by the Saechsicher Works,

with 5' driving wheels; or an "Atlantic" for the Danish Railways by the Berliner Maschinenbau Co., with wide firebox, four-cylinder compound, saturated steam, bar-framing and driving wheels  $78\frac{1}{8}$ " diameter. These makers also exhibit a fine 4-6-0 heavy passenger engine having 6' 6" wheels, cylinders  $16\frac{1}{8}$ " diameter by  $24\frac{1}{8}$ " stroke, 1,659 sq. feet of heating surface, 569 sq. feet of super-heating, grate area 28 sq. feet, and 170lbs. to the sq. inch pressure.

The Breslauer Co. exhibit a powerful 4-4-0 simple super-heated locomotive with two outside cylinders and piston-valves and motion, weighing 60 tons, apparently a fine, swift locomotive. The cylinders have 21.6" diameter with 24.8" stroke, driving wheels 6' 8", 1,485 sq. feet of heating surface and 412 sq. feet of super-heating, a grate area of 25 sq. feet, and a pressure of 170lbs. to the sq. inch.

Two curious affairs, one a petrol-electric rail motor and an accumulator ditto, are also exhibited, and seem carefully designed and thought out, the accumulator train consisting of two close coupled coaches, with bogies at extreme ends and single axles at middle ends. The bodies of the coaches finish near the bogies and change into vast boxes for the batteries. The



#### HOW THE GERMAN ENGINE DRIVERS BLOW THE WHISTLE.

petrol-electric train is provided at one end with two 30 H.P. motors driving a generator, the current from which drives the tram-type motors on the axles.

A fine electric coach is shewn by the Breslauer Works with Winter-Eichberg motors and A.E.G. equipment. The coach is a composite second and third class, the roof of which carries two "fiddle-bow" trolleys, fore and back, for taking the 6,000 volt. monophase current in the wires and transmitting it to the two 200 H.P. motors.

Several steam goods locomotives are also exhibited, on one of which are employed the Stumpf continuous steam-current cylinders; this system consists in making the cylinder about double the length of the stroke, and the piston about the same length as the stroke; steam is admitted by poppet valves at each end, and the exhaust takes place through ports situated in the centre of the cylinder and round it.

In the main hall, as well as in the German section, which is self-contained, numerous specimens of coaches are shewn, of all classes, separate and composite, travelling post-offices, Belgian and German, and also, of the latter nationality, a "speisewagen" *de luxe*, a saloon coach and a composite first and second corridor coach. However much we may have to learn, though, in locomotive designing from our Continental friends, they have little to teach us in coach-building, nay, they can still take a tip or two from us.



To sum up this rather long and dry enumeration, it may be said that the Continent is certainly bustling ahead in locomotives ; there, locomotives can be built quite as well and as cheap as at home, and, moreover, less fettered, manacled and hampered than our engineers are, either by tradition or intellectual apathy, designs, researches, novel types and details are constantly being produced to keep pace with the varying conditions of service and progress in the art of the engineer, greatly, think we, to the advantage of railways and public. Some detail or design may be dubious or puerile, but it none the less proves a laudible ambition in technical circles to attain a high ideal of ambition, which greatly redounds to their credit, and which ought to be applauded.

But, some reader may exclaim, we have had enough talk about Continentals and their new-fangled notions : come, now, tell us what there is in the way of English locomotives.

English locomotives ! dear reader ! English locomotives ? Who has ever heard of such things ? Do they really exist ? Between you and I, I don't think so. They are a pure myth, a poet's fiction, an allegory, the expression of a long-died-out tradition—anything you please, save reality.

To judge by the Brussels Universal and International Exhibition, British locomotives are as dead as Queen Anne, and simply linger amongst the fond remembrances of a glorious past—of a glorious past during which a Stephenson or a Trevithick were not ashamed to bring out and try new ideas and publish them to the world, obeying the biblical commandment about the light and the bushel, contrary to the present-day tenets of good taste and etiquette.

The result of the application of these principles is that, in London, you can buy French, Belgian, German, American and goodness knows whose locomotives ; but an English locomotive on the Continent is rarer than, let us say, a pink elephant !

Two names of English firms figure as solitary exceptions in Brussels : Messrs. Hawthorn, Leslie & Co., with a crane locomotive, and with the locomotives of the Miniature Railway Company of Great Britain, the two solitary survivors of some gigantic cataclysm which has, apparently, engulfed all other railways and firms, a phenomenon not unlike Sam Weller's knowledge of London, extensive and peculiar !

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### A NEW FEATURE

#### **"NOTES FROM MODEL RAILWAY WORKSHOPS."**

WE are always desirous of increasing the usefulness of *Model Railways*, and, acting on the suggestion of one of our readers, we are instituting a new column under the above heading. We therefore ask readers to send us along practical notes on any problem involved in the building of a model railway. As a recognition of the trouble taken, we shall remunerate readers whose contributions are chosen for insertion with goods obtainable from any of our advertisers, and will duly advise competitors of their success. The articles should deal with one subject at a time, and the MS. should be written on one side only. Working drawings, photographs and sketches are solicited, and should all bear the name and address of the author on the back.

Envelopes enclosing contributions should be marked with above heading, and be sent to the Editor of *Model Railways* at the new address, 2 and 4, Tudor Street, London, E.C.



# DESIGN FOR MODEL COUNTRY STATION FOR No. 0 GAUGE RAILWAY.

BY H. GREENLY.



IN the issues of *Model Railways* for November and December last, designs were published for a model country station suitable for a No. 1 or No. 2 gauge railway.

Although perhaps not above criticism, this design proved popular, and a good many amateurs have successfully built model stations to these drawings. The No. 0 gauge men, however, have demanded a similar design, and, like most *Model Railways* readers, won't be happy until they get what they want. The design, which forms our centre plate this time, is the result of this agitation, and, the writer submits, provides the simplest possible construction, combined with realistic effect.

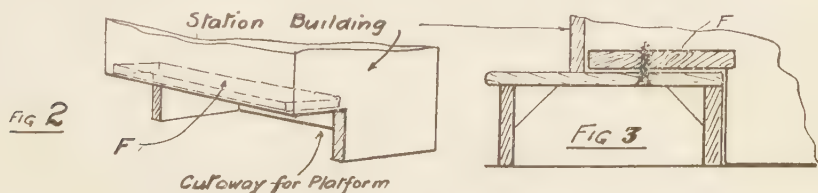
The lengths of the platform are made to suit the standard aluminium castings which are obtainable now in No. 0 gauge, as well as in Nos. 1 and 2. The lengths of these fences are:—

Plain fence, 6" long.

Ramp pieces (right or left-hand),  $4\frac{1}{2}$ " long for 5" ramp.

Fence with nameboard, 7" long.

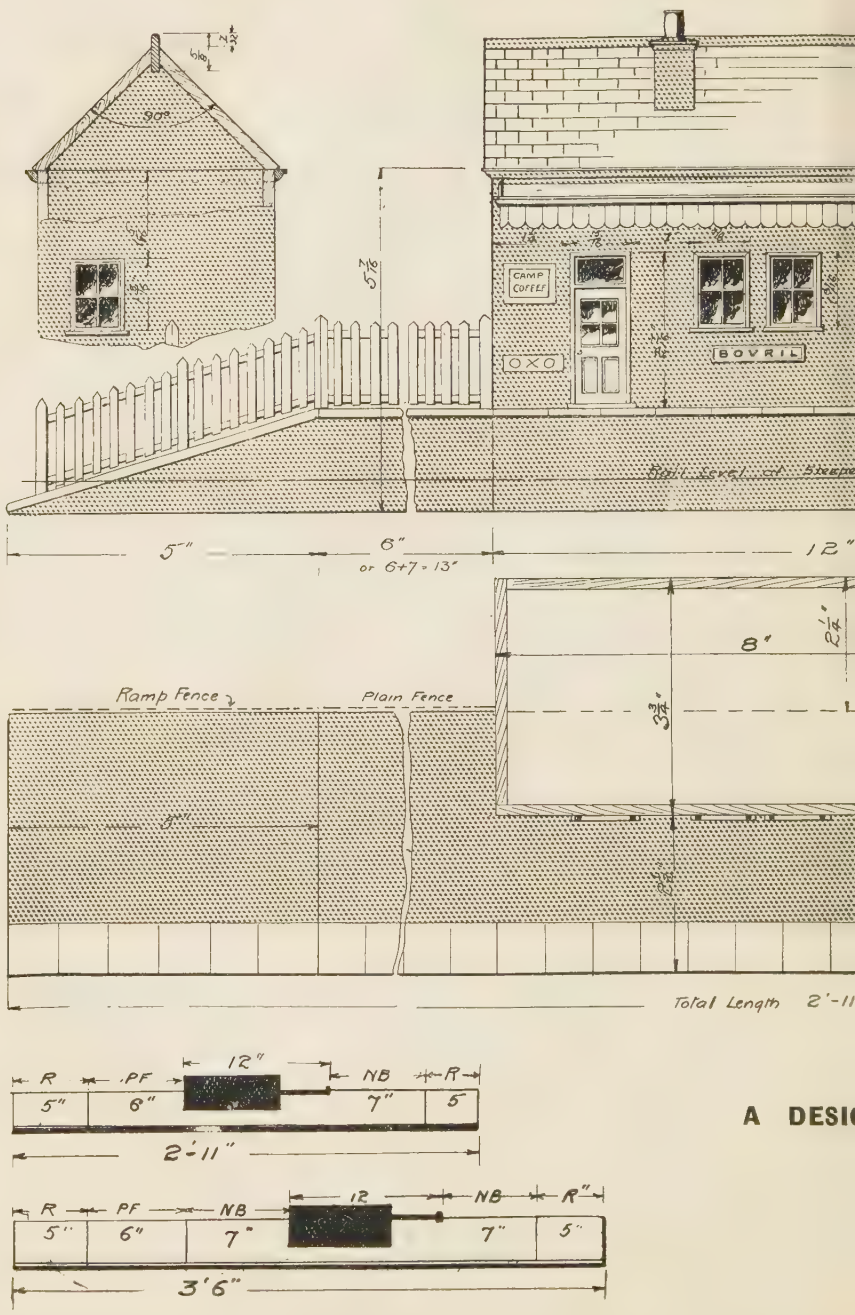
Therefore with a single nameboard on the right-hand end of the platform, the total length of the station platform will be 2' 11". The addition of



## FIXING STATION BUILDING TO PLATFORM.

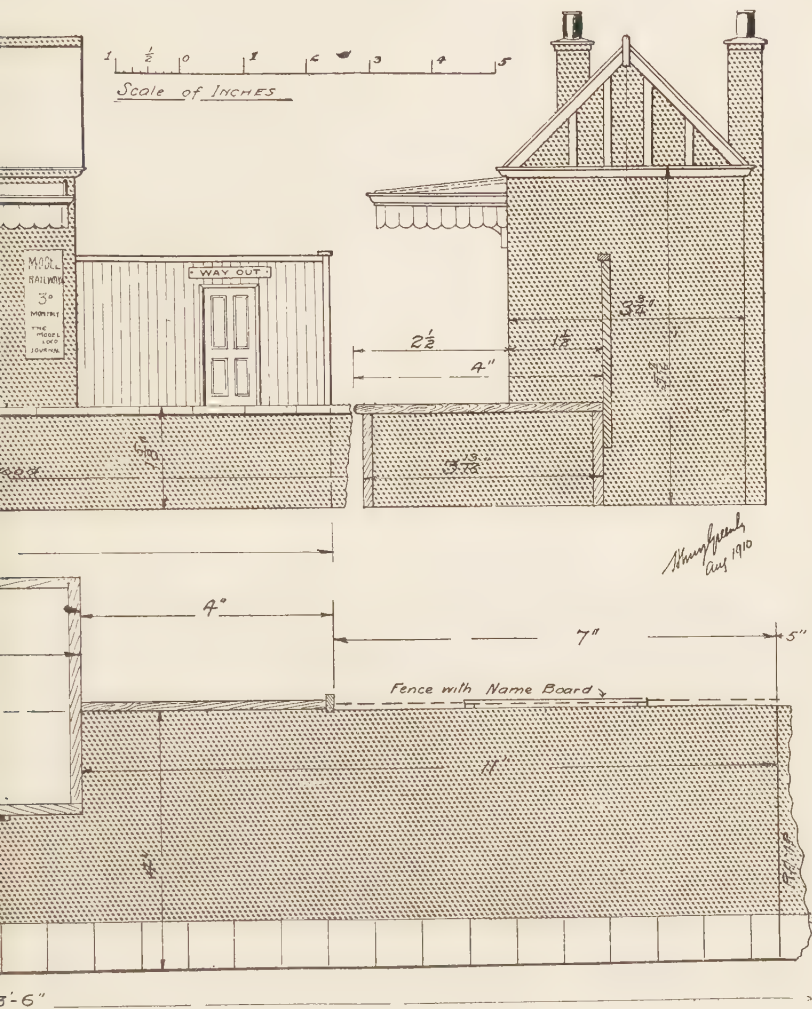
another piece of fence with nameboard on the left-hand will add 7" to the length, bringing the total length of the platform up to 3' 6". For a 4' station a piece of plain fence may be fitted on either side of the station building, as desired. The small key diagram at the foot of the general arrangement drawing fully explains the difference.

In this present design the platform is made in one piece 4" wide over



A DESIGN

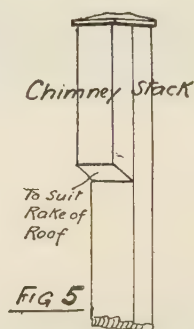
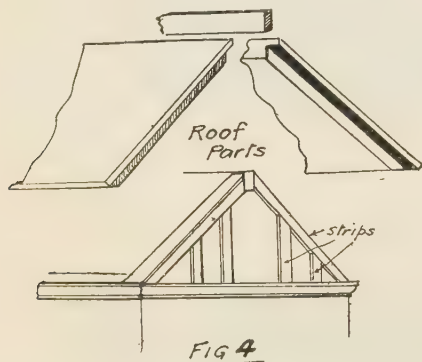
(KEY PLAN).



FOR A No. 0 GAUGE MODEL COUNTRY STATION,  
By HENRY GREENLY.

(Drawing  $\frac{1}{3}$ rd full size).

the coping, the front wall being set back  $\frac{3}{16}$  of an inch. The edge of the coping is rounded, and the separate flagstones are demarked with incised lines in the wood, the long line which is spaced  $\frac{3}{4}$ " away from the edge being cut with a carpenter's marking gauge (one with a knife tool) and the cross-lines with a marking knife, any roughness being cleared with a three-cornered or other edged file before painting. The back wall of the platform is flush with the edge to allow of the fence castings being attached easily. The platform may be supported by about five cross-bearers of  $\frac{1}{4}$ " wood, one at each ramp joint, and three equally spaced in between, and also by angle blocks glued in as illustrated on page 39 of our December, 1909, issue (see Fig. 12). Where aluminium castings for the fences are deemed too expensive, the post-and-wire fence illustrated on page 390 of the above-mentioned issue may be used, the posts being spaced about  $2\frac{1}{2}$ " apart, and made of wood  $\frac{3}{16}$ "  $\times$   $\frac{7}{32}$ " square, with pointed tops. The posts should stand up about  $1\frac{1}{2}$ " above platform level, and the narrow edges ( $\frac{3}{16}$ ") should face the front. Two wires  $\frac{1}{16}$ " diameter may be used for the rails.



The station building is fitted over the platform for a distance of  $1\frac{1}{2}$ ", and the sides therefore must be cut out as shown in the sketch Fig. 2 herewith. To fix it down to the platform, the portion which rests on the top of the platform should be fitted with a floor, as indicated in dotted lines at F, Fig. 2, and in section in sketch Fig. 3. A couple of screws may then be driven through from the underside of the platform, and secure the two portions together.

The roof of the station is quite simple. Fig. 4 shows the component parts. The half timbered gable is made by glueing on strips as shown, and painting the strips a dark brown and the "filling" space between with white paint over a previously sanded surface. The chimney at the back is secured to the wall, and is made of two strips  $\frac{5}{16}$ " thick  $\times$   $\frac{3}{4}$ " wide, one of which extends only as far as the eaves of the roof. The ovolo moulding represents the guttering stops on either side of the chimney breast. The chimney in front is fixed to the roof, and extreme care must be taken in bevelling off the foot, otherwise it will not stand upright.

The windows and doorways are not pierced in the main walls. The writer's experience in connection with the station buildings for C.P.R. model illustrated in the August issue showed this to be unnecessary in a No. 0 gauge model. The outlines of the doors are marked by a strip of wood (which would be the architrave moulding in a real wooden building). The strips are about  $\frac{1}{16}$ " thick  $\times$   $\frac{3}{32}$ " wide, and are glued on to the face of the wood.



The doors and windows are drawn on paper, and glued on after the buildings are painted, care being taken not to paint the wood on which they are stuck.

The awning may be built up as shown on Fig. 3, page 366 of the November issue, 1909, or it may be made of metal with a piece of ground glass let in the top.

The matchlined wall with the "way out" door is easily made. A plain piece of wood is cut to the required size and scribed on the face with vertical lines  $\frac{3}{16}$ " apart. The doorway is made by glueing on strips all round as shown, and the space so enclosed either painted a different colour, or covered with a doorway drawn on paper, coloured with water-colours and sized and varnished.

The top of the wall is capped by a strip of wood and the end fitted with another larger strip, to represent a post, which in turn is fitted with a square finial. Advertisements are added *ad lib*.

The building may be painted with flat colours, either buff to represent a wooden building, with a red tile or slate coloured roof, the chimney being red to represent brickwork. Oil colours should not be used, but "flat" colours ground in turps. The fence should of course be painted white and the nameboard picked with a black ground for white letters. One way of doing this is to draw the name on paper and stick it on to the nameboard.



"THE PRIZE MODEL RAILWAY PHOTOGRAPH."

By Mr. Aubrey Brocklebank, of Sandiway, Cheshire.

THIS photograph shows his  $2\frac{1}{2}$ " gauge outdoor railway, and is awarded first prize in the competition announced in the August issue.

The second prize goes to Mr. J. D. MacDowell, of Station Cottages, St. Fillans, for some very good pictures of a  $2\frac{1}{2}$ " gauge outdoor line and a model N.E.R. engine.

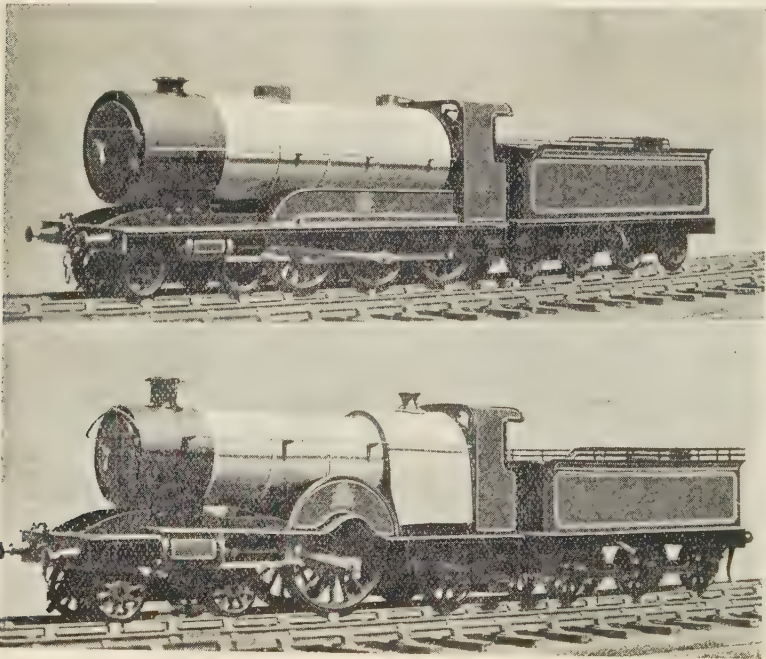


# MODEL LOCOMOTIVE CONSTRUCTION

## THE MODELS OF IMPROBABLE G.N.R. LOCOMOTIVES.

*(See August issue, pages 267-269.)*

THE model locomotives which were illustrated by outline drawings in our last number have been finished, and the photographs reproduced herewith will give a better idea of the appearance of these locos than the drawings above mentioned. We are always desirous of encouraging originality in the design of model locomotives, and shall be glad to have our readers' ideas



as to what would make a successful model locomotive. As in the case of the locomotives now under discussion, the model line upon which the engines are intended to work, and the conditions of service, will make certain features imperative, just the same as in real practice. For instance, G.W.R. singles would be no use on the Highland Railway, and therefore the chief aim of the model loco designer should be to provide the best possible engine for the given railway.

## AN OLD STATION ON THE GREAT CENTRAL.

A CORRESPONDENT to the Great Central Railway Journal describes in an interesting manner the old fashioned station at Barrow Haven, illustrated herewith. He says it is the only one of its kind left on the Great Central

Railway. It is situated between New Holland and Barton, and is on a single line worked by train staff. According to an old record at the station, it was opened for passenger traffic on April 8th, 1850, so that the station has been in use over sixty years, and during that period there has only been ten stationmasters, viz., Messrs. Hopkinson, Percival, Evans, Sissons, Marris, Broughton, Blackbourne, Storey, Colville, with the present one Mr. F. Durham, who is seen on the platform. There is only one building (wood), which comprises waiting-room, booking-hall, and stationmaster's office. The entire staff is the stationmaster, who is a man of many parts, viz., stationmaster, signalman, ticket collector, porter, gateman (there is a level-crossing close to the station) and lampman. Block working is in operation between New Holland and Barrow Haven, and after receiving the trains on

[G.C.R. Journal]

BARROW HAVEN STATION.

By permission]



he has to go outside to pull the signals off. His duties are not very hard but monotonous, as he is on duty first train to last at night, and would, I believe, be glad to change with any of the stationmasters who think their hours are also long.



An amusing incident occurred at Barrow Haven station many years ago ; the cash bag with the day's receipts in *got lost*, and was reported to the Police Department at Sheffield. After a week's search it was found intact with the sum of 1½d. in it.

The population of Barrow Haven is about one hundred, and the inhabitants chiefly work at the surrounding brickyards, and are not very great travellers, only going to Barton and Hull markets. The most important day in the year is when the school children go to Cleethorpes for their annual outing at the seaside. Trains used to stop when required, and the usual remark to the guard was, "Stop at Barrow, guard"; but now all trains stop, so it is better for all concerned, as the passengers often used to get over-carried, much to their annoyance.

This station brings to mind an amusing anecdote of a gentleman from London coming to reside in the country : he was expecting a chicken-house coming by rail ; he went to the station with a dray, and, during the station-master's absence, seeing a wooden structure, thought it was what he wanted, got it loaded up. On his way home he met the stationmaster in full uniform, who said, "What have you got there." He replied, his chicken-house — "Chicken-house be hanged, you have got the railway station," and ordered him back again with it.



A NEW KIND OF HOBBY HORSE. (Right away driver!).



### MR. J. W. D. MELLOR'S INDOOR MODEL RAILWAY.

THIS railway is laid in an attic measuring  $20' \times 6\frac{1}{2}'$ . There is a sky-light window, and the entrance is by a ladder through a hole in the floor. The line is o gauge and consists chiefly of a continuous main line, which is double throughout, and two termini, one for up and one for down trains, the latter being situated at the end of a short spur line. The track is supported on boards at a height of about  $3'$  from the floor, the boards resting on wooden supports, with the exception of the part marked B on the plan, where they are screwed on to iron brackets.

There are two "through" stations as well as the two termini. Station C is roofed with gelatine, and station D has an umbrella roof made out



MR. J. MELLOR'S INDOOR RAILWAY. VIEW NEAR THE NEW SIGNAL BOX.

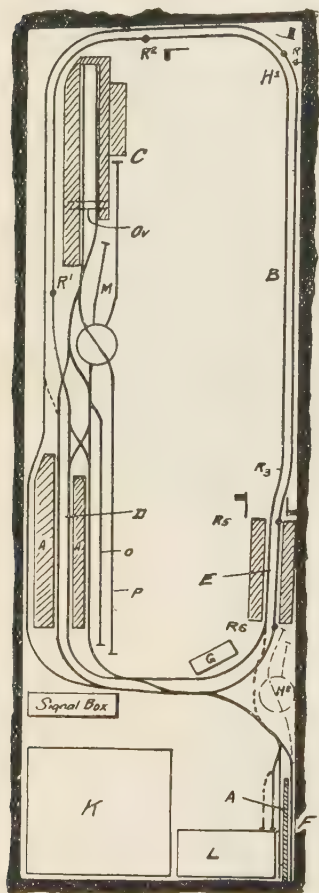
of cardboard, and painted. The platforms are made to look very realistic by sticking on to them dark grey-coloured emery-paper to imitate asphalt. The edges are painted white.

The signals, being necessarily so numerous, have all been omitted in the plan, with the exception of four, which are automatic. Their normal position is down, but as soon as a train enters a section an electric circuit is made through the wheels and axles. This pulls the signal to danger by means of an electro-magnet, the signal not being released until the train is clear of the section. Of course this is not practicable with tin-plate sleepers, as there would then be a circuit through the sleepers.

All the signals, and the greater number of the switches, are worked from the signalbox, the exterior covering of which was kindly made for the writer by a friend. A second signalbox has been installed to control the new section of the line where the "mountain" H<sub>2</sub> once stood. An electric telegraph is being set up between the two boxes. The present box contains twenty levers, and the new one will contain eighteen. The method of working the points is as follows:—They are held over in one position by elastic, or by a weight hung underneath the track by a piece of string. When

the lever in the box is pulled, the points are pulled over, and return to the first position again when the points are released. Some of the switches and all the signals are home-made.

Part of the line is ballasted with sand glued on to the boards, but this is now being replaced with granite chips. The line is lit up at night by small electric lights. There are two tunnels under "mountains," which are made of dark green crinkled lamp-shade paper sprinkled with coarse sand, and covered in places with dry moss. The longer tunnel has an entrance which is made by smearing grey plasticine over cardboard cut to the required shape. Then lines are ruled on the plasticine with a pointed instrument to imitate the mortar in brickwork. This looks very realistic.



PLAN OF MR. J. W. D. MELLOR'S  
INDOOR MODEL RAILWAY.

- A.—Platforms.
- B.—Portion screwed on to brackets.
- C.—Terminus.
- D.—Through Station.
- E.—Through Station.
- F.—Terminus.
- G.—New Signal Box.
- H.—Rockery (Mountains).
- K.—Entrance to Room.
- L.—Bench.
- M.—Goods Sidings.
- O.—Engine Road.
- P.—Carriage Siding.
- R.—Electric Signal Sections.

(Dotted lines under construction).

There is an extensive time-table, based on that of the L.S.W.R., providing twelve trains per hour from 9 a.m. till 6-55 p.m.

There are six locomotives, all driven by clockwork, three of which are four-wheeled engines, and three 4-4-0's. All six have a brake, and five are fitted with reversing gear. One of the four-wheeled engines originally had a tender, but it has been converted into a tank by affixing two tanks and a bunker. Two of the 4-4-0's are fairly strong, but the third is very strong

indeed, easily pulling five eight-wheelers at a high speed twice round the system. There are three L.S.W.R. locos, two G.N.R. and one M.R. The goods stock numbers fifteen, and the passenger stock is comprised of ten four-wheelers and six eight-wheelers. All the passenger stock is L.S.W.R., with the exception of two blue S. & D.J.R. four-wheelers. Some of the rolling stock is fitted with a home-made brake, which works very satisfactorily.

# MODEL RAILWAY ENGINEERING.

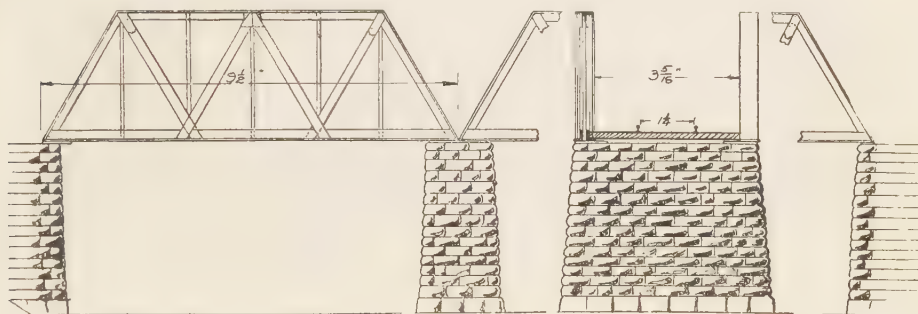


## MODEL BRIDGES.

BY HENRY GREENLY.

FOR some reason or other, the writer has noticed that the amateur railway engineer, when it comes to bridge building, often fails to obtain a realistic structure. It is therefore proposed in this and following articles to include notes and drawings which will assist our readers in the production of realistic model bridges.

The materials of model bridges are numerous. The writer has seen very creditable girders constructed out of "Meccano" materials. Wood



NO. 0 GAUGE GIRDER BRIDGE, AS PROVIDED ON THE C.P.R. EXHIBITION MODEL.

a useful material, but is apt to give a coarse appearance when it is attempted to make a girder imitating iron construction. Model bridges and viaducts which are intended to represent brick or stone structures are not difficult to make up in wood, and when painted, have a very solid appearance. A design for a three-arch viaduct, based on a model made by Mr. A. P. Whatley for a 4" gauge outdoor line, will be found in my article for *The Captain*, Xmas, 1908. This system of building bridges will, however, be dealt with later on.

The use of plate stuff, brass or steel, of course involves a considerable amount of labour, especially if the riveted joints of the prototype are copied to anything like scale. Castings can be used for small gauge bridges, but it is of course not worth making the necessary metal patterns unless several girders are required. This method is therefore usually left to trade firms.

The first example of which I would like to speak is the No. 0 gauge girder bridges made for the Canadian Pacific Railway models at Brussels and Vienna. In these models, to give a relief to the surface and to provide a means of getting at the underground section, a depression in the base or "ground" of the model is formed. This depression is spanned by the girder bridge



shown in the drawing herewith, and by the photograph of a similar bridge using the same girders which has since been made.

The girders are a species of "Warren" truss, but as about ten girders were required for the C.P.R. model, a metal pattern was made and castings obtained therefrom. The piers and abutments of the C.P.R. model were also modelled to represent rough-hewn blocks, each stone being cut out in relief with suitable chisels and painted a stone colour. As will be seen by the drawing the girders have feet at each end through which screws are driven into the piers (which by the way are hollow boxes of  $\frac{1}{4}$ " wood). The floor of the bridge is a piece of  $\frac{5}{16}$ " board, on which the chairs are laid direct,



MODEL THREE-SPAN GIRDER BRIDGE FOR A NO. 0 GAUGE RAILWAY.

and the thickness of the wood about equal to that of the sleepers. There is no difficulty at the ends in running off on to *terra firma*.

In the photograph the piers are similarly made by having a capping at the top (formed by the top board) and a string course. The abutments are similarly made, and have wing walls, against which the earth is piled. I think that my readers will agree that the photograph of the model is sufficiently deceptive. The "trees" are simply wall paper!

(To be continued.)



SOME rapid engineering work was executed by the staff of the London and North-Western Railway Company during a week-end in connection with the new electric suburban lines to Watford. The new route is to run about parallel with the main line to Willesden, where it will connect up with the old lines. When traffic ceased on Saturday, the staff started work on the high-level line near Willesden Junction. The embankment along which the up pair of rails have up to now run, was removed, and a girder bridge, which had been erected near by, was run into its place. This was riveted in position, and next morning the service was resumed over the bridge. The down line was shifted in the same way a week or two earlier.



### HALIFAX MINIATURE RAILWAY.

THOSE readers who have visited this railway will, we think, agree with us that it is the most picturesque public miniature railway yet constructed in this country. It runs round the whole of the Attraction Grounds of the Zoo, Chevinedge, and the length of the line is approximately a mile. Owing to the gradual slope of the ground the deep cutting and tunnel had to be constructed on the north side of the track, and the embankment on the east



THE "LITTLE GIANT" AT HALIFAX: MR. F. SMITHIES DRIVING.

and west, and wooden viaduct on the south side about 14' high. The station is situated here, and the booking office is placed on the ground level, and steps lead to the platform.

The railway this season has been one of the chief attractions of the grounds, and the locomotive is much admired by the visitors. The engine is the rebuilt "Little Giant" originally used at Blackpool, and with a new bogie tender as designed by Mr. H. Greenly for this class of engine at the Nancy Exhibition. The coaches are entirely new and of smart style.



### RAILWAY MANAGEMENT CHANGES.

L.T.S.R. LOCOMOTIVE DEPARTMENT.—Following the retirement of Mr. Thomas Whitelegg at the end of July, Mr. Robert H. Whitelegg has been appointed locomotive, carriage, wagon and marine superintendent of the London, Tilbury and Southend Railway.

CALEDONIAN'S NEW MANAGER.—The directors of the Caledonian Railway Company, at a recent meeting, appointed Mr. Donald A. Matheson, M.I.C.E., at present chief engineer, to be general manager from the date of Mr. Calthrops' retirement.



## MODEL RAILWAY CLUB.

TO THE EDITOR *Model Railways and Locomotives*,

DEAR SIR,

I quite agree with Mr. W. R. S. Smart that it would be a good thing to start a Model Railway Society, and I should be pleased to join one if started. Your suggestion that "model railwayites" should join the M.E. Society is not good enough, as there is too much discussion and practice of appallingly intricate electric work to suit anyone but an electric enthusiast. I have the first fourteen volumes of a contemporary, but gave up taking it in owing to the way railway work was neglected in recent years.

Yours truly, E. W. THOMPSON.

P.S.—I think your paper is splendid. I suppose there is no chance of it coming out oftener—weekly for choice.—E.W.T. [I am afraid not—EDITOR].

## MODEL RAILWAYS SOCIETY.

TO THE EDITOR *Model Railways and Locomotives*,

DEAR SIR,

What a jolly idea is put forward by Mr. Smart in your September issue, and how opportunely it comes. Now that realistic models are so readily procurable, there must be a tremendous number of enthusiasts who would be only too glad of the advantages of such a society, to confer and help one another. I think the greater part of them, like myself, would be abashed in the company of the "old brigade" expert engineers, who have been turning out their own locos, rolling stock, etc., in the years when such things were only obtainable by one's own brain and fingers. We others, whose engineering capacities are limited to the use of a file, some drills, a soldering outfit, and a pot of paint, could not but be conscious of our inferiority in a Society of Model Engineers, but meeting in a society of our own, should feel more on a level. Already the building of our railway has brought me in touch with new friends in my neighbourhood who are similarly interested, and we would all be glad to extend our acquaintanceship in other directions.

The most practical means of forwarding the suggestion would appear to be the medium of your magazine. Would you be able to find space in your paper for a section which would represent the official organ of such a society? Could you not arrange a scheme by which the subscription would cover membership and the *Model Railway* magazine? I think all your present subscribers would jump at the chance of the additional privileges included in the double subscription.

How would it be if you licked the idea into shape, and inserted a loose leaflet in your next issue, outlining the proposal and leaving a space for would-be members to sign a proposal form at foot, fold over the sheet, and return it with a half-penny stamp to your address printed at back? The

result of such a canvass would soon enable you to determine the probable amount of support, and once a nucleus was established I am sure the society would spread in all directions. Possibly the Editor might be willing to undertake presidential honours? and one of your enthusiastic readers volunteer as secretary? Anyway, if the scheme is to be possible, I know of no more practical method of interesting the right circle quickly and effectively than through the channel suggested above.

If any points put forward are feasible and useful, I am only too pleased to have helped in my small way, and remain,

Yours very truly,

CECIL M. SANDERS.

"SEFTON,"

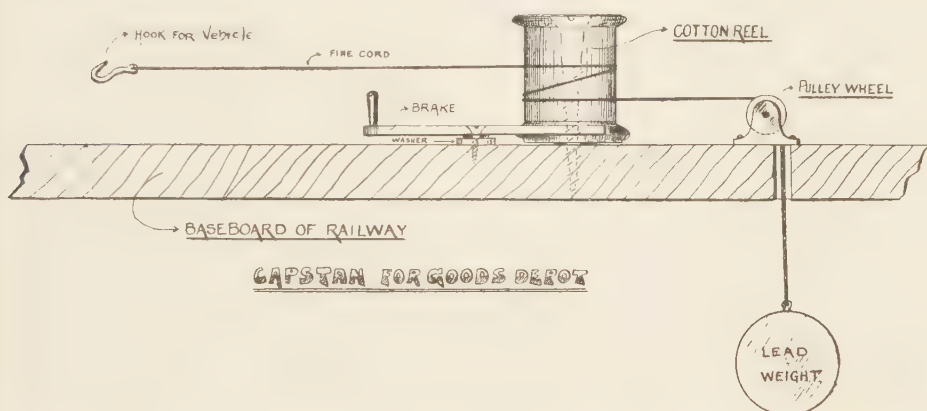
SIDCUP, KENT.

### A HOME-MADE MODEL CAPSTAN.

TO THE EDITOR *Model Railways and Locomotives*,

DEAR SIR,

I am enclosing herewith a drawing of a home-made capstan which I have had in use for some time on my model Midland and Great Northern Joint Railway. Having found it of some service for shunting purposes when a



locomotive is not available, I thought perhaps it might be of use to some other reader. It consists of three parts—a fair-sized cotton reel, working on a long screw as pivot, screwed into the baseboard of the line, with a washer beneath to allow the reel to revolve freely; the cable—for this I use a fine fishing line, being strong and easy running, with a small hook at one end, the other end being fastened to a lead weight which provides the motive power, the line running over a small pulley wheel and through a hole in the baseboard; the brake (which is of the friction type) is made of wood, mounted on a small screw and washer as before, the screw being driven home sufficiently to allow of the brake holding the reel by contact when a truck is attached. Needless to say, the capstan is mounted in the "six-foot" and clear of all running lines, and by having a collection of "clip-on" weights to increase the motive power, very heavy vehicles can be hauled, the length of run, or distance hauled, being only governed by the distance or height the weight has to fall. I have found that with the vehicle on the move, a sudden application of the capstan brake is sufficient to detach the hauling hook, and allows the vehicle to

perform a species of "fly shunting," when it can be diverted to whichever road is desired by the "foreman."

I trust that this diagram and notes on same will be of some use to those whose locomotive stock is not so extensive that they can always detail an engine for their marshalling sidings. Apologising for intruding on your valuable space, and with every good wish for the continued success of *Model Railways*.

Yours faithfully,

RALPH D. SKELTON.

P.S. We have got a railway staff in miniature—but *when* are the platelayers and their flagman, also in miniature, also coming along? Surely this is a crying need in these days of fine granite chip ballast?

[The model drivers and firemen make good platelayers.—EDITOR. *Model Railways and Locomotives*.

#### PHOTOGRAPHING MODELS—STEREOSCOPIC PHOTOGRAPHY.

TO THE EDITOR *Model Railways and Locomotives*,

DEAR SIR,

I suggest that the fuzzy results obtained by G.S.E. & W.R. (Dulwich) are due to not stopping down enough. One great difficulty in photographing model railways is that the depth of the view required is so great relatively to its mean distance. The only method of meeting this difficulty is by stopping down the lens as much as possible (up to say  $f/44$  as a practical limit) after focussing sharply for the mean distance of the object, or, preferably a little *nearer* than the mean distance. Even with a fixed focus hand camera stopped down to this amount, good definition can be obtained to about six feet distance from the lens.

A model railway is a subject that lends itself readily to the taking of stereoscopic views by means of just an ordinary camera. It is only necessary to take two photographs, one after the other, shifting the camera about  $2\frac{1}{2}$ " at right-angles to the line of sight after the first photograph. The prints, on being mounted 3" apart, give a very good effect in a stereoscope, well worth the slight extra trouble in obtaining two pictures instead of one.

Yours faithfully,

9, CARLTON TERRACE, BLACKPOOL.

LAWRENCE H. A. CARR.

#### THE MODEL RAILWAY CLUB.

TO THE EDITOR *Model Railways and Locomotives*.

DEAR SIR,

Mr. Smart suggests forming a Model Railway Club. I should like to point out that on the G.C.R. there is a Model Railway Club. The headquarters are at Leicester, and are fitted up with lathes and everything for model loco building. More particulars from the secretary, Mr. Craig, 41, Princess Road, Leicester.

Yours truly,

J. WARD.

#### ANSWERS TO CORRESPONDENTS.

H. W. (Radlett).—Our mistake. See page 266 of Aug., 1909, for plan of the G.N.R. Brussels model.

CAPT. F.C.M.—Many thanks for the photo. A description will be welcomed.



J. E. P. H. (London).—Although it is simply a practical point which could only be settled by careful experiment, we think that two engines pulling a train is better than one pushing and the other pulling. Theoretically there should be no difference.

F. POPE (St. Leonards).—We will not forget the drawing of the L.B.S.C.R. tender (outside framed) in our next issue. The request for articles on wagons is duly noted.

B. DE N.—We cannot tell. Write them direct, or to our other advertisers.

H. M. C. (London, S.E.).—What scale of model G.W.R. single do you require drawings for.

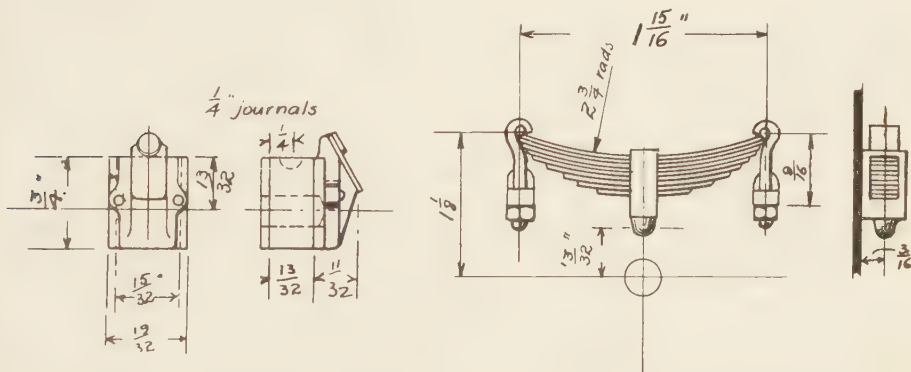
A. H. B. (Plymouth).—Thanks for cutting from local paper.

R. J. G. (Shepherd's Bush).—You can lay the track to any radius. To blow off at the right pressure is the function of the safety valve. If it does not when the pressure accumulates above the safe working pressure, then your engine may go the same way as Mr. Skelton's—it may expand, visibly.

### READERS IN DIFFICULTIES.

#### DIFFICULTY NO. 155.—MODEL L.N.W.R. TENDER AXLEBOXES.

A. G. D. (Nottingham) writes:—Could you include in your next issue a sketch of axleboxes and dummy springs suitable for the 11/16" scale model L.N.W.R. standard tender described in your September issue.



MODEL TENDER AXLEBOXES, L.N.W.R.

SPRINGS AND HANGERS.

We append dimensioned drawings of the axlebox and spring. The latter, if cast, may have a spiral spring concealed in the buckle. The drawing shows them built up to scale. This method of course is only suitable for a glass-case model, unless spiral springs are used under the hanger nuts.

#### DIFFICULTY NO. 151.—FLAME SUPERHEATERS.

NEMO (Stratford-on-Avon) writes:—I am building a No. 1 gauge model locomotive, and wish to fit a flame superheater. In drawing the loco, I arranged it so that the steam pipe, after leaving the regulator in the cab, was run directly under the boiler, through the flame of the spirit lamp. Since then I have thought that, when the regulator is turned on, the sudden rush of steam through the "superheater tube"—which will be made of copper—will cause it to crack. I shall feel very much obliged if you would help me out of this difficulty.

Although this difficulty is encountered in real practice and is provided for by special dampers, there is no such trouble in model work, except, perhaps where non-packed piston valve cylinders are employed and the excessive heat of the steam sometimes causes the pistons or piston valves to "stick" or seize. With a packed cylinder the trouble is seldom experienced, although with brass valves and cylinders the port faces sometimes suffer.

DIFFICULTY NO. 152.—LINK MOTION FOR A  $\frac{1}{2}$ " SCALE MODEL "ATLANTIC" LOCO.

H. W. J. (Bushey) writes:—I am thinking of building a model of an "Atlantic" locomotive for a  $2\frac{1}{2}$ " gauge railway, and wish to fit Stephenson's link motion. Which is the best method to adopt, that with the link *behind* the leading coupled axle like on the G.N.R. engines, or with the link in front as adopted in G.C.R. engines and, I believe, in the "Little Giant"?

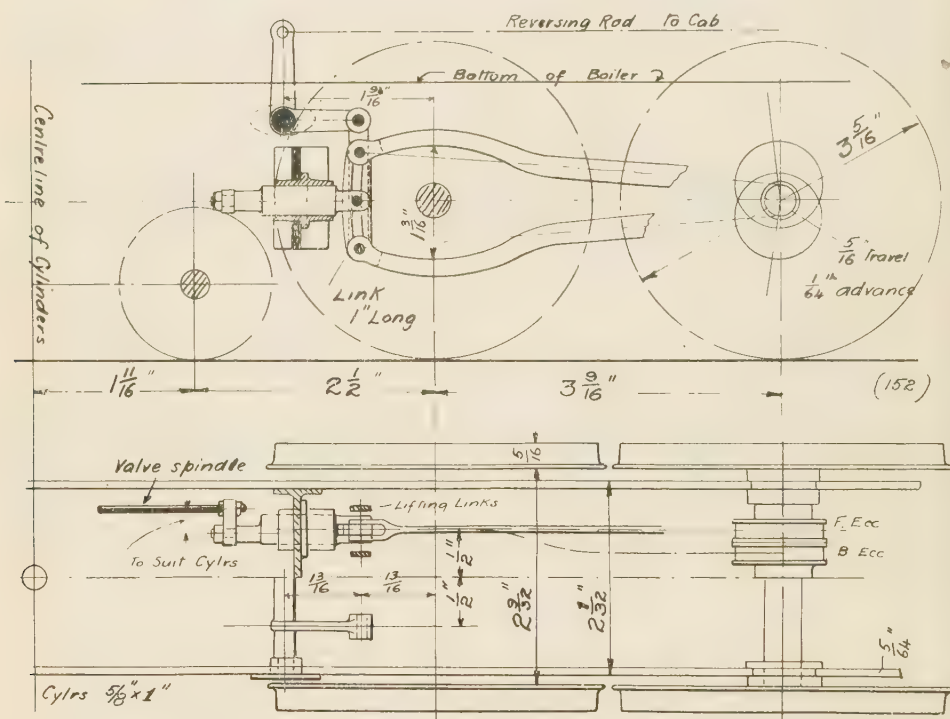


DIAGRAM OF LINK MOTION FOR  $2\frac{1}{2}$ " GAUGE MODEL "ATLANTIC" OR 4-6-0 TYPE LOCO. (Half full size)

We reproduce to half full size a sketch of the motion we would recommend. As will be seen, the eccentric rods embrace the coupled axle like in the G.C.R. "Atlantics" and six-coupled engines. To keep the weighbar shaft clear of the eccentric rods it is placed in front of the link. This is unusual practice, but there is nothing against it, and it gets over the difficulty which is encountered in models of modern large boilered engines which are fitted with Stephenson's motion. The intermediate valve-spindle is made very large, so that the fork may be obtained from the one piece of rod. The eccentric rods being long, a very nice distribution should be obtained. With short rods the tendency is to get too much lead of the valves.



A Monthly Journal devoted to Model Railway construction and working.

— Edited by —  
HENRY GREENLY.

Editorial and Advertisement Offices—  
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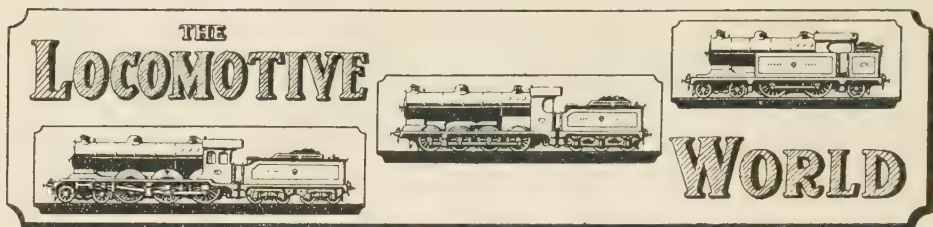
### TO OUR READERS.

WE have to thank the ever-increasing circle of readers who are responding to our request for support, both by sending along useful notes on the construction of their models and by bringing the journal to the notice of other enthusiasts. It also gives us great pleasure in accentuating our indebtedness to our friends in Sheffield. Mr. Guy Mitchell, whose railway is *the* feature of this issue spared no trouble in assisting us to prepare the article, and we think that the description of the line gives a good idea of the immense amount of labour the building of the line has involved. Whatever may be the criticism, its completeness and comprehensiveness will hardly be assailed. In addition, there is no doubt as to the power of the little  $3\frac{1}{2}$ " gauge tank engine: it not only pulls a passenger with ease up hill and down dale, but does this continuously.

Our next issue will be a special Caledonian Railway Number, and at the moment of writing we are busy collecting as much useful information about this line as is possible. We shall be glad of any photographs and particulars of models based on Caledonian practice, as we wish to make this number an even greater success than the G.N.R. number in July.

In further reference to the proposed Model Railway Club, we have received up to the time of going to press about twenty names, and although this is hardly enough to act upon, we shall be communicating with those who have replied to our notice in the last issue within the next few days. Will all readers who can see their way to supporting the proposed "Model Railway Club, please let us have their names, and the 6d. postal orders required to defray initial expenses. Mr. W. R. S. Smart has promised to assist in the formation of the club, as far as his duties with the Post Office (which are arduous during the Xmas season) will allow. Possibly some reader will make a suggestion as to a suitable place in London for the preliminary meeting.

We would call readers' attention to the announcement of the change in the conduct of this journal made in this column in the last issue. All communications with reference to the conduct of this journal should be sent to the new office at 2 and 4, Tudor Street, London, E.C. Our foreign and colonial subscribers will kindly take notice of this in despatching their yearly subscriptions.



## THE EXPRESS LOCOMOTIVES OF THE LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

(Continued.)

BY CECIL J. ALLEN.

Six of these locomotives, which were known as class D2, were built, and the success of these fine engines in service was so marked that Mr. Stroudley decided to make them a standard type, with certain modifications. Accordingly, during a period commencing in December, 1887, and concluding in April, 1891, he brought out no less than thirty-six of these locomotives, known as the "B" or "Gladstone" class, in which the dimensions of the pioneer engines were substantially increased. The boiler diameter was increased to 4' 6", the heating surface to a total of 1,485 sq. feet, and the area of the fire-grate to 20½ sq. feet. The cylinder diameter was increased to 18¼", with a stroke of 26"; the inclination remained 1 in 11½, and the slide-valves were arranged underneath. The wheel diameters and wheelbase remained the same, but the weight in working order of the engine was increased to 38½ tons, of which 28½ tons were available for adhesion. Standard tenders were supplied to these engines, with the same weight and capacity as those furnished to the "singles."

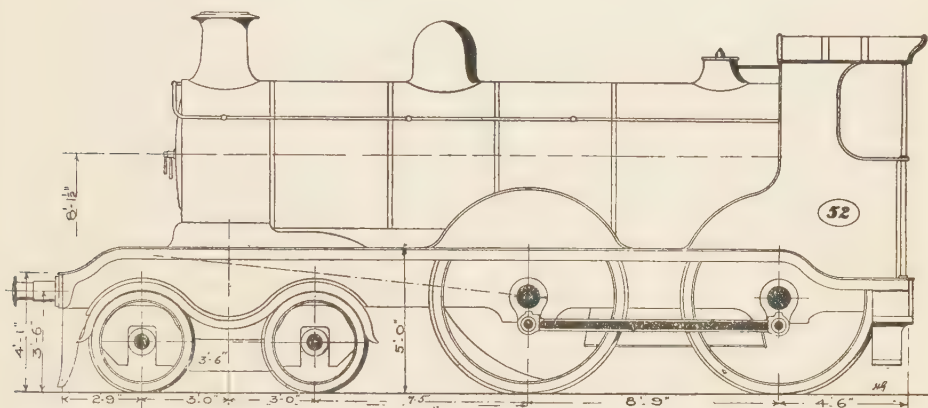
Of these engine No. 189 "Edward Blount" was exhibited at the Paris Exhibition of 1889, and obtained a gold medal, afterwards remaining in France for some weeks for the purpose of running competitive trials on the P.L.M. Railway. In the year 1908 this same locomotive was fitted by Mr. Marsh with Hammond's patent apparatus for heating the air prior to its combustion in the firebox, consisting of two unsightly "wings," fixed on either side of the smokebox, for the purpose of collecting air from the atmosphere while running, which is then passed through the smokebox for heating, and from there to a point under the fire-grate.

At this point the history of Mr. Stroudley's express locomotive designs concludes, as he was seized with a chill in Paris while conducting certain locomotive experiments, and died suddenly on December 20th, 1899. There is no doubt that his work has left its mark on British locomotive history more than that of any other locomotive superintendent of the Brighton line, and this fact alone would justify us in devoting so much space to his engines. His characteristic constructional features were very numerous, among which might be mentioned inside bearings to all wheels, including those of both engine and tender, a steam dome, placed on the third, or back ring of the boiler, and fitted with spring balance safety-valves, and also such small details as flat-topped cabs and copper-capped chimneys. The gamboge colour with which his engines were painted doubtless proved a real service of advertisement to his line, even if expensive to maintain, and for smart appearance his "stud" was probably unsurpassed in his time, while, in



addition, there can be no question that his locomotive creations ranked among the most famous engines of the day.

Mr. Stroudley was succeeded by Mr. R. J. Billinton, the effects of whose *regime* were soon made apparent by various internal and external modifications of design. Mr. Billinton's first express engine, indeed, could scarcely have exhibited a more radical departure than it did from Mr. Stroudley's practice, being of the 4-4-0 type, as against the then standard 0-4-2 type. This engine appeared in June, 1895, and, after the customary Brighton twelve months' trial, was succeeded by a further twenty-three engines, the last of which was turned out in 1898. Among the principal external departures from current L.B. & S.C. locomotive design were the long raised running-plate from front to back, now standard, the abandonment of the smart copper-



MR. BILLINTON'S 4-4-0 TYPE No. 52 "SIEMENS" CLASS.

capped chimney for a plain cast-iron erection, and the removal of the dome from the last to the middle ring of the boiler. The use of a leading bogie was also, of course, an innovation on the Brighton line.

The principal dimensions of these engines, which, on their appearance, were of somewhat noteworthy power for the period, were as follows:—The boiler was pitched 7' 7" from rail-level, was 4' 5" in maximum external diameter, and 10' 7 1/4" in length, having 267 1 5/8" tubes with a heating surface of 1,227 sq. feet. The firebox heating surface was 115 sq. feet, and the area of the fire-grate 18 3/4 sq. feet. Thus the total heating surface was one of 1,342 sq. feet. The cylinders were 18" diameter by 26" stroke, placed within the frames and inclined at 1 in 20. The driving wheels had a diameter of 6' 9", and the bogie wheels of 3' 6". The coupled wheelbase was 8' 9", and the total wheelbase 21' 11"; while, of a total weight in working order of 42 3/4 tons, 28 3/4 tons were available for adhesion. In the same month as that in which the last of these engines appeared, a further locomotive, No. 213 "Bessemer," was turned out, with a boiler 3" larger in diameter, and pitched 4" higher from rail-level. In this boiler there were 209 tubes, giving a heating surface of 1,350 sq. feet, while the firebox, with an enlarged grate area of 20 1/2 sq. feet, contributed a further heating surface of 110 sq. feet, total 1,460 sq. feet. The engine was by this means increased 2 tons in weight, of which

1 $\frac{1}{2}$  tons extra were available for adhesion. All these engines were fitted with the large pattern of six-wheeled tender, supplied by Mr. Billinton to his first 0-6-0 goods engines, in which an innovation was introduced in the matter of outside frames. These tenders carried 2,600 gallons of water and 4 tons of coal, weighing in working order 26 $\frac{3}{4}$  tons. The names and numbers of the twenty-five engines of this class were as follows:—

|                                       |                          |                       |
|---------------------------------------|--------------------------|-----------------------|
| 171 "Nevill."                         | 208 "Abercorn."          | 317 "Gerald Loder."   |
| 201 "Rosebery."                       | 209 "Wolfe Barry."       | 318 "Rothschild."     |
| 202 "Trevethick."                     | 210 "Fairbairn."         | 319 "John Fowler."    |
| 203 "Henry Fletcher."                 | 211 "Whitworth."         | 320 "Rastrick."       |
| 204 "Telford."                        | 212 "Armstrong."         | 321 "John Rennie."    |
| 205 "Hackworth."                      | 314 "Charles C. Macrae." | 322 "G. P. Bidder."   |
| 206 "Smeaton."                        | 315 "Duncannon."         | 323 "William Cubitt." |
| 207 "Brunel."                         | 316 "Goldsmid."          | 324 "John Hawkshaw."  |
| Also the enlarged No. 213 "Bessemer." |                          |                       |

Such was the success attending the working of these engines that in April, 1900, a still further enlarged type of 4-4-0 locomotive issued from Brighton works. In these machines the boiler was increased in diameter to 4' 10", providing 1,650 sq. feet of heating surface, while the firebox had the enlarged grate area of 23 sq. feet. The cylinder stroke of 26" was retained, but the diameter was increased to 19"; the driving and bogie wheels remained as before, 6' 9" and 3' 6" diameter respectively. The working pressure was 170lbs per sq. in. The weight in working order was 49 tons, of which 33 tons were available for adhesion; the total wheelbase was 22' 2", of which, as before, 8' 9" represented the distance between coupled centres. A larger tender was also provided, with space for 3,000 gallons of water and 4 tons of coal, weighing 28 $\frac{1}{2}$  tons. Three of these engines were built at first, Nos. 52-54, but they were in 1901 succeeded by a further series, in which slight modifications were introduced. The dome was again removed to the back boiler ring, a new type of safety valve fitted, and the pitch of the boiler raised 1 $\frac{1}{2}$ "; the working pressure was raised to 180lbs., and the heating surface reduced by 15 sq. feet. These engines have done some magnificent work on the Brighton line, the most noteworthy record being that of June, 26th, 1903, when No. 70 "Holyrood" hauled the then "Pullman Limited" of three Pullman's and two brakes, weighing 115 tons, from Victoria to Brighton in 48 $\frac{3}{4}$  minutes. From Grosvenor Bridge, Victoria, to Brighton goods sheds, pass to pass, the average speed was no less than 65.2 miles per hour. On the up journey on the same day, the time was only 50 $\frac{1}{4}$  minutes, also within the mile-a-minute rate. A maximum speed of 90 miles per hour was attained on the down journey. This same engine also achieved a number of other noteworthy runs about this time, including the haulage of a 400-ton train from Brighton to London in 65 minutes. This is sufficient to show what the L.B. & S.C. Railway might do, even with older engines, on the Brighton service—11 $\frac{1}{4}$  minutes, or 18 $\frac{3}{4}$  per cent. less than the present fastest time of one hour. The names and numbers of these engines were as follows:—

|                       |                             |                   |
|-----------------------|-----------------------------|-------------------|
| 42 "His Majesty."     | 53 "Sirdar" now "Richmond." | 64 "Windsor."     |
| 43 "Duchess of Fife." | 54 "Empress."               | 65 "Sandringham." |
| 44 "Cecil Rhodes."    | 55 "Emperor."               | 66 "Balmoral."    |
| 45 "Bessborough."     | 56 "Roberts."               | 67 "Osborne."     |
| 46 "Prince of Wales." | 57 "Buller."                | 68 "Marlborough." |
| 47 "Canada."          | 58 "Kitchener."             | 69 "Bagshot."     |
| 48 "Australia."       | 59 "Baden-Powell."          | 70 "Holyrood."    |

|                          |                 |                   |
|--------------------------|-----------------|-------------------|
| 49 "Duchess of Norfolk." | 60 "Kimberley"  | 71 "Sussex."      |
| 50 "Tasmania."           | 61 "Ladysmith." | 72 "Goodwood."    |
| 51 "Wolferton."          | 62 "Mafeking."  | 73 "Westminster." |
| 52 "Siemens."            | 63 "Pretoria."  | 74 "Cornwall."    |

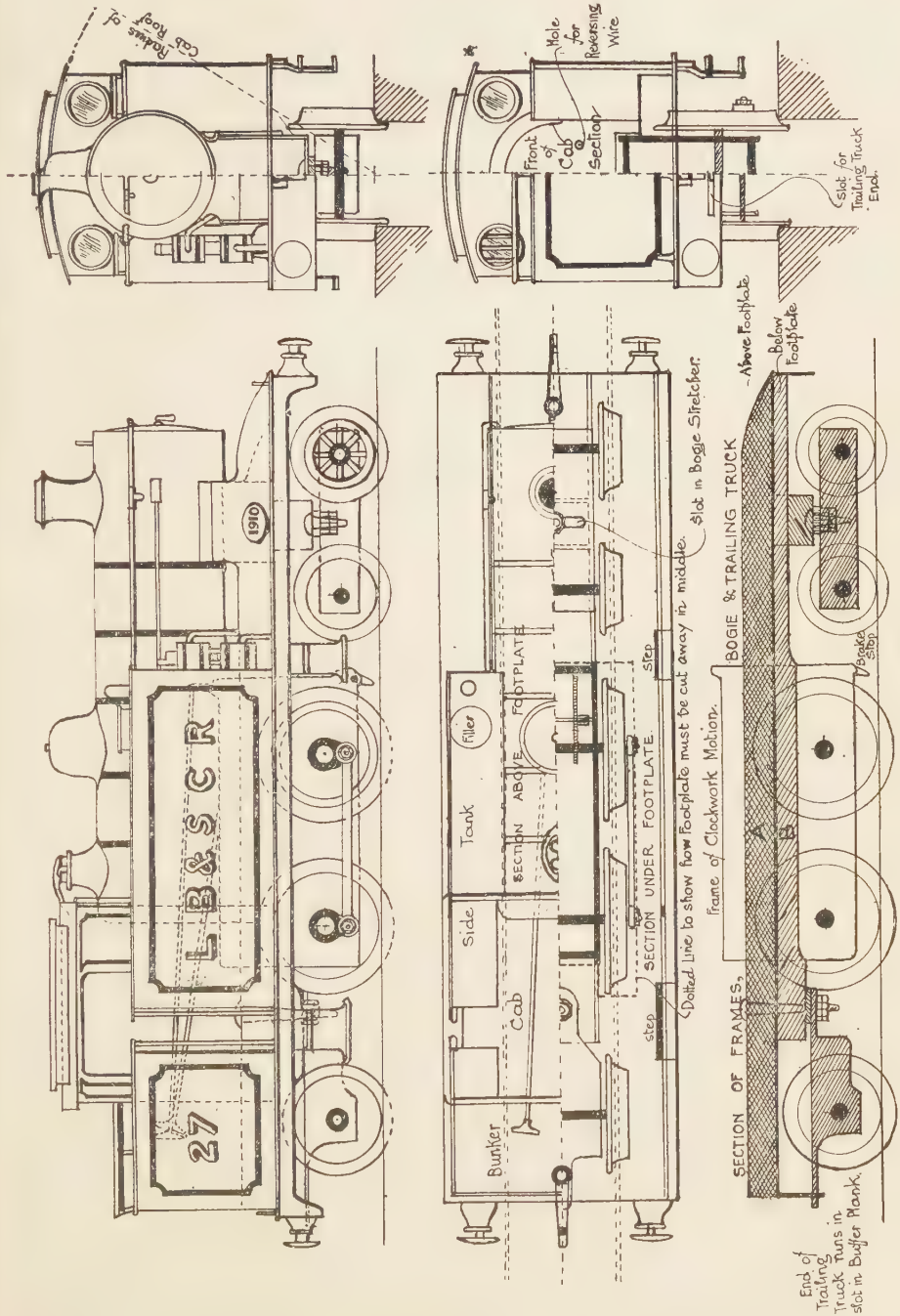
With the succession of Mr. Earle Marsh, from the G.N.R., in 1904, further great changes took place in locomotive construction on the L.B. & S.C.R. They were introduced by the construction of five large "Atlantic" or 4-4-2 type locomotives in 1906—Nos. 37-41—modelled throughout, both internally and externally, exactly on the familiar lines of those in use on the G.N.R. The driving wheels are the same, 6' 7½" diameter, with the same coupled wheelbase of 6' 10", but the bogie and trailing wheels conform to the usual L.B. & S.C. standard of 3' 6" diameter; the total wheelbase is the same as that of the G.N.R. engines—26' 4". The boiler and wide firebox are identical in pattern; the former is pitched with its centre 8' 8½" from rail-level, and, with its length of 16' 4" and diameter of 5' 6", affords a total heating surface, with the firebox, of 2,473 sq. feet; the latter has a fire-grate area of 31 sq. feet. The important differences lie in the cylinders, which are 18½" diameter by 26" stroke, against the Great Northern 18¾" by 24", and the working pressure, which is 200lbs., against the G.N. 175lbs. per sq. in. The weight of these engines in working order is 67 tons, of which 37¾ tons are available for adhesion. A further enlarged tender is provided, with a capacity for 3,500 gallons of water and 4 tons of coal, and weighs 39½ tons in working order. These engines, with their tractive effort of 20,500 lbs., have already justified their existence on the Brighton line. On June 30th, 1907, No. 39 ran the "Pullman Limited," consisting of seven Pullman cars and two brakes, and weighing in all 228 tons, from Victoria to Brighton in 51¼ minutes, despite the fact that several severe engineer's slacks were in force for the widening works at different points. A new series of this type is now under construction, to be fitted with the Schmidt superheaters that have been tried so successfully on the tank engines, with certain other resultant modifications in design.

As Mr. Billinton's standard 4-4-0 express engines come in for heavy repairs, Mr. Marsh is now fitting them with a new standard boiler, which, for the purpose of effecting economies through standardization, will be common also to the 0-6-2 and 0-4-4 tanks, and the 0-6-0 goods engines. An extended smokebox is provided, resting on a saddle, while a new pattern of built-up chimney and a new type of safety-valve are also fitted. The new boiler is 10' 10¾" long, and 5' in maximum external diameter, but owing to a reduction in the number of tubes to 243, the total heating surface is reduced to 1,286 sq. feet. The working pressure is also reduced to 170lbs. per sq. inch, and the grate area to 18¾ sq. feet. The weight of the engine is less than previously, the total being 46½ tons, of which 30¾ tons are available for adhesion.

Among other noteworthy changes under Mr. Marsh's *regime* have been the abolition of the old gamboge colour for locomotives in favour of the present umber shade, which is much less expensive to maintain, the abolition also of distinctive names for engines, save in a few special cases, and the lettering of the initials of the company—L.B. & S.C.R.—in large gold letters on the tender. The large 4-4-2 tank locos. now take a share in the express train working, but the consideration of these types will be left for a future occasion. In conclusion, it may be said that, although the trains constantly grow heavier, Mr. Marsh's powerful and up-to-date locomotive "stud" is doubtless capable of a good deal more remarkable work than is imposed upon it by the present moderate schedules of the expresses on the Brighton line.

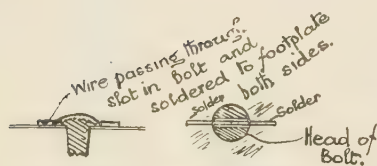
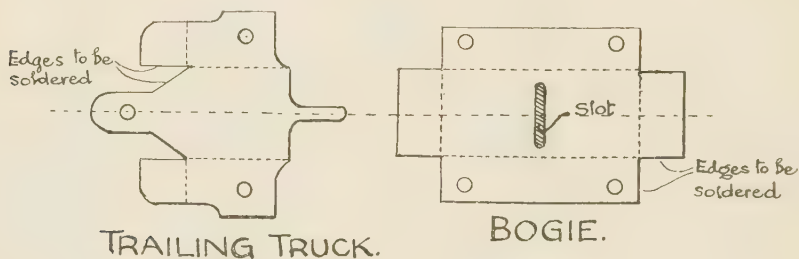




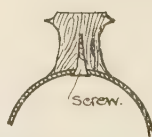


In some makes I believe clips are used instead of screws. Dotted lines on the plan in drawing show the well hole that must be cut out in the footplate to clear motion and wheels. When the top frames are soldered on, the bogie and trailing truck may be proceeded with. These pieces are dotted where they have to be bent; the shaded portion in the bogie must be cut out, for the purpose of allowing the bogie pin plenty of play for curves and points. After wheels have been added, they can be fastened to the frames by bolts and nuts—two nuts for each bolt are recommended, as the second one keeps the other one taut.

It will be advisable now to give the frames and wheels a trial trip on the rails, as it may be found necessary to add a small piece of lead somewhere between the top frames for the proper balance and adhesion.



METHOD OF KEEPING  
BOGIE PIN STILL.



METHOD OF FASTENING  
BOXWOOD CHIMNEY.

DETAILS OF MR. W. R. S. SMART'S DESIGN FOR MODEL  
NO. 0 GAUGE CLOCKWORK TANK LOCOMOTIVE.

The boiler, cab, bunker, and side tanks should be made separately, and soldered in their places, care being taken to see that everything fits before fixing. In making the bunker and tanks, a better finish is secured by turning over the top edge, thereby reducing the risk of cutting fingers when a hurried dive may later on have to be taken to save it from falling off the table, or wherever the railway may be laid. As regards the chimney, dome and valve cover, the difficulty of getting a good finish may be avoided by getting a local wood-turner to turn them in boxwood (from a full-size drawing supplied him); they can then be fastened to the boiler-barrel before it is soldered on, by a screw.

These additions are now obtainable in the larger sizes, and manufacturers may perhaps be tempted later on to make them for No. 0 gauge. I myself make my Great Western chimneys of a piece of brass cartridge, and a large sail eyelet for the cap; the small eyelets make very good caps for valve covers.

It will be found necessary to cut a piece out of the bottom of boiler-barrel for the purpose of clearing the clockwork. Such details as coal rack on bunker, handrail, Westinghouse brake, pump and filler on tanks, need not be made; that of course rests with the maker, but they improve the model, and well reward him for the trouble taken. Guard-irons have not been included in the drawing, as they would probably be broken off in the first derailment the engine would have. Neat soldering should be attained as far as possible; any superfluous solder should be removed by filing.

The adhesion and tractive power of the engine will be greatly improved if rubber bands are fastened with seccotine on the driving wheels. Get from a rubber shop the bands called "Bankers' Assistants," 1d. each; one band cuts into three: they are studded, and effectually prevent any slipping on the part of the locomotive. Before fitting them myself I have noticed repeatedly that on loading an engine the wheels revolved much faster than the train went; this slipping will also result from greasy rails.

On finishing the erecting of the engine, a couple of coats of enamel should be applied, and then picked out with a fine brush. It should be stood by for a week for the enamel to get quite hard, otherwise the fingers will mark it.

Any little point in the details not understood I shall be pleased to answer and make it as clear as possible to the builder of a model on the lines indicated in this little article.



### MODEL RAILWAYMAN'S BOOKSHELF.

*Our Home Railways*; by W. J. Gordon. Parts 3, 4, 5, 6, 7 and 8. (Frederick Warne & Co., London.) Price 9d. each nett.

These parts of the series of books referred to in our last issue deal with the L.S.W.R., L.B.S.C.R., S.E. & C.R., G.E.R., L.N.W.R., and G.N.R. systems respectively, and are in the same style. Part 5 contains interesting diagrams of various railway appliances, such as special signals, indicators, mileposts, gradient marks, etc. The Great Eastern section also includes photographs of some of the swing bridges on this line, which should be useful to the model maker. A very good picture of the mail van apparatus is also to be found in the L.N.W.R. part.

*The Railway Clerks Assistant.* By George B. Lissenden. Published by P. S. King & Son, Westminster, S. W. Price 1/6 net; 1/9 post free.

This little book is one which should prove extremely useful not only to railway officials but to members of the general public who have trading relations with railway companies. It is written in a readable style, much more so than one would imagine from the title, and at the outset deals with the duties of the clerical staff of a railway and with the origin and history of railways more particularly from the standpoint of the parliamentary and legal control of railway trading operations. The remaining chapters treat such subjects as duties and liabilities of railway companies both as to goods and passengers and their luggage, railway rates and classification of consignments, and lastly on passenger fares. The appendix includes useful notes on the educational facilities afforded to railway clerks and officials.

## NOTES ON POWER FOR MODEL ELECTRIC RAILWAYS.

BY GEO. D. DUNKERLEY, B.Sc.

So many amateurs who have previously only used clockwork or steam engines are thinking of arranging their model railways for electric traction, that there is ample scope in our journal for some elementary notes on the subject of the necessary power—how to best obtain it, and how to use it efficiently.

It is realised by a large number of model locomotive builders that electricity provides increased facilities in operating a model railway, and better control over the engines. The question therefore arises as to the means necessary to obtain the desired results, and as a large majority of readers are not conversant with the elementary facts of electrical science, even a slight knowledge of them will not be assumed in the course of these articles. The writer will begin at the beginning.

The notes should also be useful to those who intend to retain their steam and clockwork locomotives, but wish to fit one or more of the many electrical devices which can be applied to control the starting and stopping, to work signals and points from any required distance, and for lighting up stations and carriages.

Three methods of obtaining the power have been suggested:—

- (1) The use of primary batteries;
- (2) The production by a small dynamo;
- (3) Accumulators or *storage* batteries.

At the present time the use of primary batteries is not to be thought of. The consumption of the necessary acid and zinc, say, in the bichromate battery, is expensive—the continued renewal and consequent mess is a source of worry, and the failing of the current at frequent intervals is enough to stifle all enjoyment. Many a budding engineer has had his hopes, and in some cases career, cut short by a prolonged tussle with a battery of primary cells.

With regard to accumulators, as a rule one prefers to have them charged up for a small fee at the nearest reliable electricians. Some firms make a practice of charging accumulators on the contract system—that is, charging an accumulator as often as required (and therefore keeping them in good order) for a comparatively small yearly payment. This is found by motorists far the cheapest and most satisfactory method. To understand the use of accumulators and dynamos for the production of power, it is necessary to get a clear idea of what electrical power means, and how it is measured.

Power means the amount of work done in a certain time; for instance, one horse-power indicates that 33,000 foot-pounds of work can be done in one minute. The real work done obviously depends on the length of time that the rate of working is kept up for. Electric power may be compared with steam or water power. Steam power depends upon the pressure and the *amount* of steam available. The power of a water stream depends on the pressure and the amount of water. In the same way electrical power varies with the pressure and the amount of electricity flowing. It is measured by the product of pressure (volts.) and current (ampères). This gives the



power in watts, *i.e.*, amps.  $\times$  volts. = watts. An ampère means a certain quantity of electricity flowing per second. A volt is the pressure required to drive one ampère through a unit amount of resistance called one ohm. The mechanical power equal to a certain electrical power is easily determined for:—One Horse Power = 746 watts;

$$\text{Amps} \times \text{Volts} \\ \text{or, } \frac{\quad}{746} = \text{Horse Power.}$$

A motor for a model locomotive requires from 3 to 6 ampères. Taking 4 ampères as an average, the pressure required to keep up this current will depend on the resistance which the rails and connections offer. For tin-plate models, a voltage of 4-6 generally suffices; but for hand-made or scale models 8 to 10 volts are required. If the resistance is known, and also the current required, the necessary voltage can be calculated from the formula known as Ohm's law, namely

$$\text{Amps} = \frac{\text{Volts}}{\text{Ohms}}$$

Assuming a voltage of 6 and a current of 4 amps, the power used will be  $6 \times 4$  watts = 24. This would be equivalent to  $\frac{24}{746}$  Horse Power, or roughly  $\frac{1}{30}$  H.P.

The production of power with a small dynamo is a good method, but as the dynamo requires driving by mechanical power, the extra attention that has to be paid to the plant takes a great deal of time. This is, of course, a great disadvantage, for it means less model running. The use of accumulators is the method the writer would recommend to all who have a limited time and a small electrical knowledge. These have to be charged up periodically, and this could be done by a dynamo plant as indicated above, or through a resistance (or a rectifier in the case of alternating supply) from the electric light mains.

*(To be continued.)*



### “MODEL RAILWAYS” PRIZE SCHEME.

In our last Editorial notice we appealed to our readers to do what they could to bring the paper under the notice of those interested in models, locomotives, and all things appertaining thereto. As an incentive we are therefore offering a prize in goods from our advertisers to the value of £1 is. od. respectively to the reader who introduces the greatest number of subscribers. A yearly subscriber will count two points and a half-yearly subscriber one point. The subscriptions may be entered on the form sometimes printed in the advertisement pages, or written in similar style, the name of the introducer of course being inserted. A remittance for the desired subscription should accompany the forms, and be posted to our Editorial Office, 2 and 4, Tudor Street, on or before January 10th, 1911.

## MODEL RAILWAYS IN SHEFFIELD.

BY THE EDITOR.

MR. GUY MITCHELL'S "BROOK HOUSE" MODEL RAILWAY.

MR. W. H. JUBB'S NEW "GREYSTONES" MODEL RAILWAY.

MR. B. E. DRURY'S "PEAKLAND" MODEL RAILWAY.

WHEN a "man fra Sheffield" takes up a thing, you may be sure that he will do it well, or not at all—and in model railway building this well-known axiom is exemplified by the excellent work of three gentlemen whose names appear at the head of these few notes. Limited space in this issue will not



FIG. 1.—MR. G. S. MITCHELL'S  $3\frac{1}{2}$ " GAUGE RECORD BREAKER.  
(3 miles non-stop with passenger ;  $1\frac{1}{4}$  miles non-stop with one firing.)

permit of the writer dealing with the whole trio of model railways mentioned above, and so the first consideration will be for the largest of the three, Mr. Mitchell's outdoor line, the "Brook House" Model Railway.

Mr. Mitchell's line has practically occupied the whole of the past summer, and judging by the amount of work it has entailed, we are afraid that the builder has had little time to spare for anything else—meals and sleep not excepted.

Our party, which included the owner of the "Greystones" model line, arrived at Mr. Mitchell's charming residence just before dark—in time to get a glimpse of the line, and to prepare ourselves for the good things next day. After dinner, Mr. Mitchell showed us his treasures, model horizontal and vertical engines, locomotives, etc., made at various times. The notable feature of the collection was a  $\frac{1}{2}$ " scale N.E.R. type single, which Mr. Mitchell fitted with scale cab fittings, water gauges, combination injectors, etc., etc.

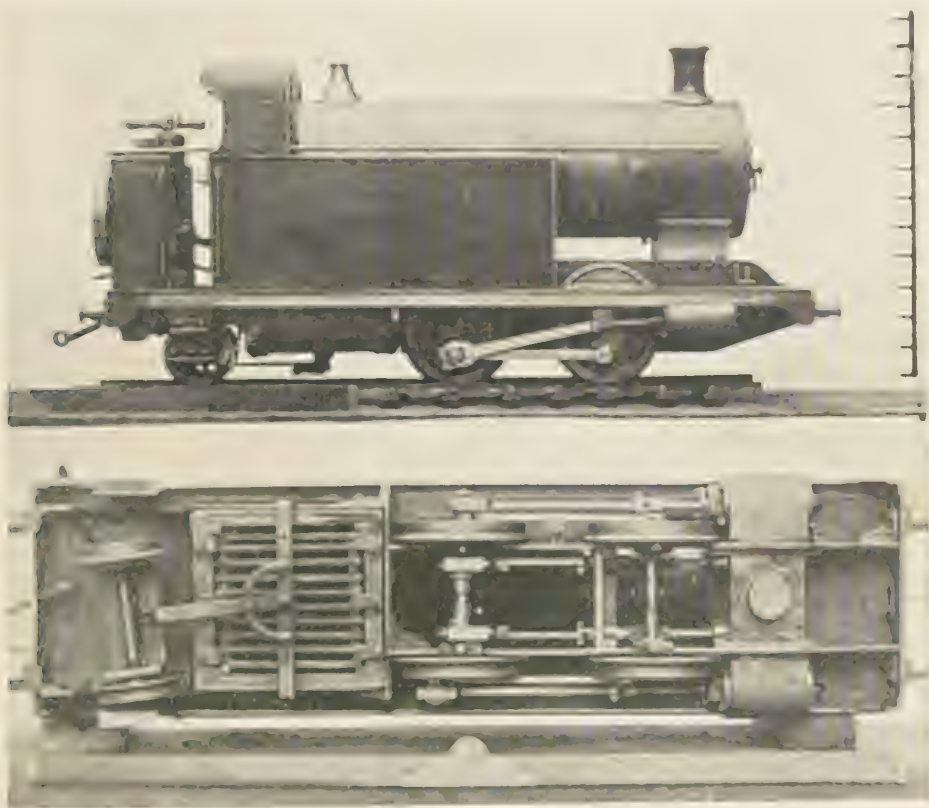


FIG. 8 —SIDE AND UNDERNEATH OF  $3\frac{1}{2}$ " GAUGE 0-4-2 TYPE TANK LOCO.

We also examined very carefully the  $3\frac{1}{2}$ " gauge tank locomotive designed and made by Mr. Mitchell, shown in the accompanying photographs, and which, as far as the writer knows, is the ultimatum for the  $3\frac{1}{2}$ " gauge. This little locomotive will pull an adult passenger indefinitely—not simply haul a big load for a short distance. Its non-stop record is *three miles*, the water supply being replenished by jugs of water handed to the driver as he passed by. The run was only finished by the fact that the "driver-passenger" overbalanced on his narrow perch, otherwise he might have been running still. At our visit it was working all day—always with plenty of steam and always

ready for action. As will be seen, this model is an 0-4-2 type tank engine, and was designed simply to do the work required of it. It was a six weeks' job, as Mr. Mitchell put it, and since its completion two years ago it has given no trouble in the least.

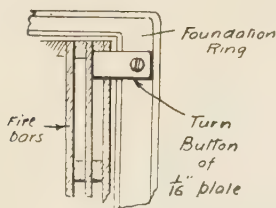


FIG. 9.—SKETCH OF FIREBOX.

The driving wheels are  $3\frac{1}{2}$ " diameter, and the cylinders are the writer's standard design (as used for the well-known  $3\frac{1}{2}$ " gauge G.N.R. model), obtained complete from Messrs. Stuart Turner, Ltd. Mr. Mitchell, however, has fitted the pistons with brass piston rings as supplied to the No. 7 Stuart sets, with most excellent results. The cylinders are 1" bore  $\times$   $1\frac{1}{2}$ " stroke.

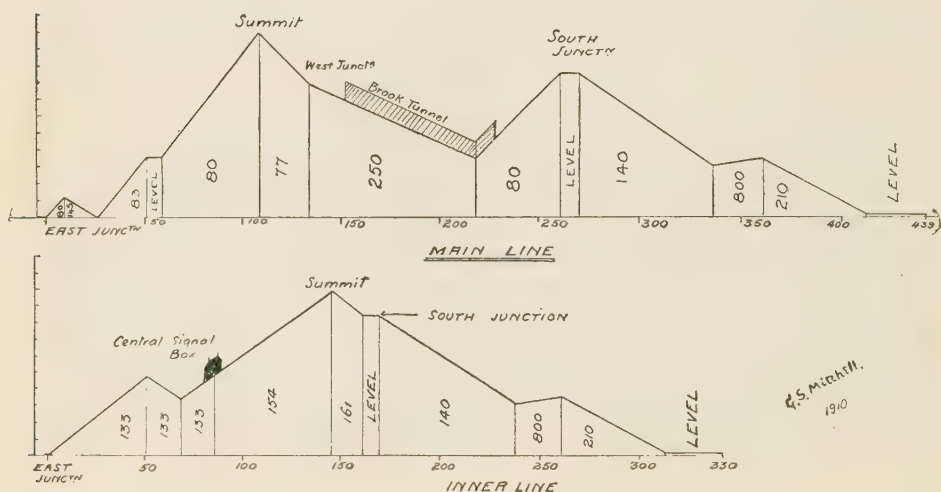


FIG. 10.—DIAGRAM OF GRADIENTS, "BROOK HOUSE" MODEL RAILWAY.

The boiler is of the loco type, with a straight side firebox made as deep as possible. The firebox is  $5\frac{1}{4}$ " long  $\times$   $4\frac{3}{4}$ " wide outside, and is  $6\frac{3}{4}$ " deep inside. It is fitted with eight field tubes  $\frac{1}{2}$ " diameter, and has an exceptionally large fire hole. Eighteen fire tubes  $\frac{1}{2}$ " diameter pass through the barrel which, by the way, is  $4\frac{1}{4}$ " diameter and 9" long.

There are several small points worthy of notice, all of which go to make the locomotive so successful. The water-feeding arrangements consist of a large hand-pump, which with a few strokes quickly replenishes the boiler.



For service conditions a steam donkey pump is employed. This has a cylinder  $\frac{5}{8} \times \frac{5}{8}$  stroke and a  $\frac{1}{4}$ " diameter plunger. Considerable trouble was

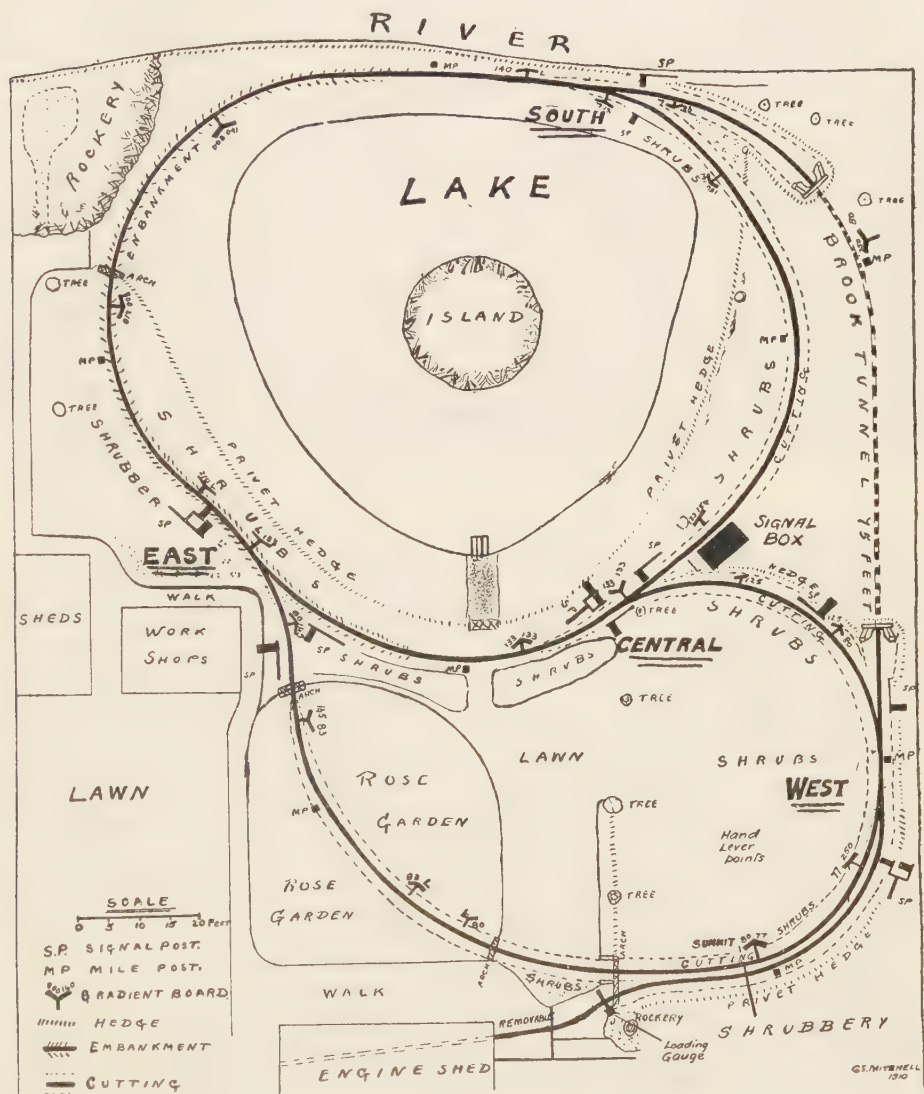


FIG. II.—PLAN OF BROOK HOUSE MODEL RAILWAY.

experienced with this pump until a small by-pass pipe was fitted to the delivery pipe. To start the pump, the cock on this pipe is opened, and when the jet of water is fairly constant it may be turned off with the full knowledge

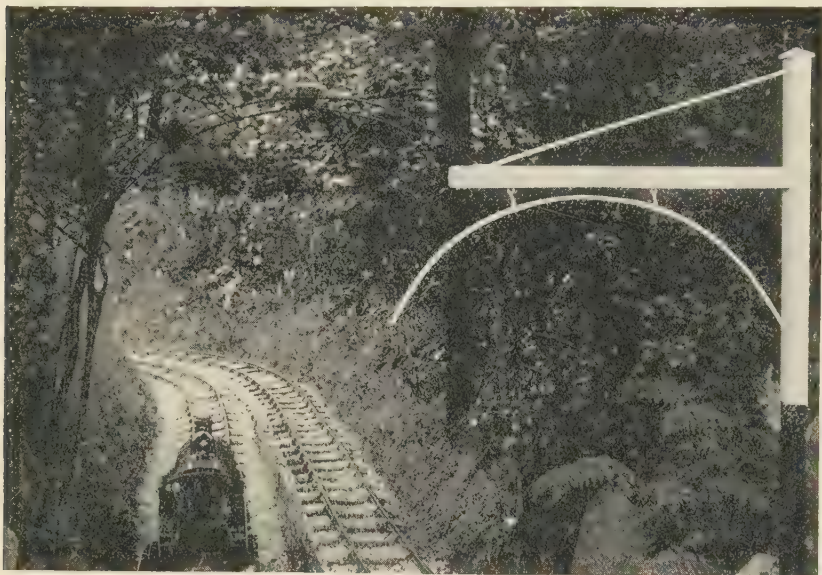


FIG. 2. —  
THE  
SUMMIT  
LOOKING  
TOWARDS  
WEST  
JUNCTION,  
SHOWING  
ENGINE  
SHED  
ROAD  
AND  
LOADING  
GAUGE.



FIG. 4 —  
THE  
"BROOK  
HOUSE"  
MODEL  
RAILWAY  
COMPANY:  
MR. MITCHELL  
(ON LOCO),  
PLATELAYER,  
SIGNALMAN,  
SHARE-  
HOLDERS  
AND  
PASSENGERS.





MODEL RAILWAY, TOTLEY, SHEFFIELD.

that the pump is doing its duty. The trailing wheel is placed clear of the firebox, and is mounted on a pony truck.

The firegrate is built up of wrought iron bars, and is affixed in a very neat manner, as shown in our sketch. These metal buttons can be easily knocked aside when it is desired to drop the bars.

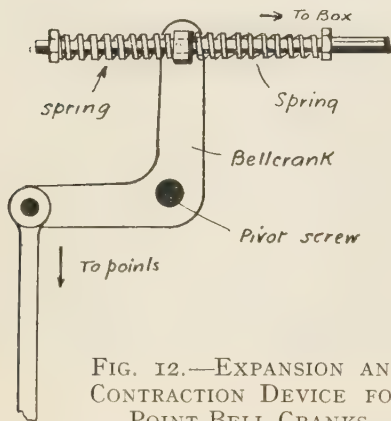


FIG. 12.—EXPANSION AND CONTRACTION DEVICE FOR POINT BELL CRANKS.

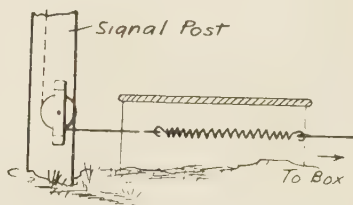


FIG. 13.—SIMILAR DEVICE FOR SIGNAL WIRES.

The working pressure of the boiler is usually 75lbs., but the engine ran quite well, during our visit, with a passenger, with a maximum pressure of 63lbs., which was the pressure at which the "Pop" valve temporarily fitted happened to be set to blow off. The boiler is built up of tube and castings for the end plates, and the joints are secured by screws—not rivets.

As the engine has to run on the  $1\frac{1}{2}$ " scale permanent way, it has large flanges. These are essential for any vehicle working out-of-doors and on the ground. One feature of the design is the use of slip eccentric reversing gear, a stop collar being provided for the pin in the eccentric to work against.

The following are the leading dimensions of the Model:—

MR. G. S. MITCHELL'S MODEL  $3\frac{1}{2}$ " GAUGE TANK ENGINE.

|                                                                                |                                                                                       |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Driving wheels $3\frac{1}{2}$ ".                                               | Firehole diam., $1\frac{3}{4}$ " round tube.                                          |
| Trailing wheels $2\frac{3}{8}$ " on radial truck.                              | Eighteen $\frac{1}{8}$ " tubes, brass.                                                |
| Axes $\frac{3}{8}$ " silver steel.                                             | Eight field tubes, $\frac{1}{2}$ ".                                                   |
| Fixed wheelbase, $5\frac{1}{4}$ ".                                             | Heating surface of boiler 430 sq. in. (excluding superheater).                        |
| Total wheelbase, 14".                                                          | Drawbar pull at 75lbs. pressure = 32lbs. With 25 lbs. pressure it will pull an adult. |
| Boiler barrel length, 9".                                                      | Total length over buffer beams, 24"                                                   |
| Boiler barrel, $4\frac{3}{4}$ " diam., solid drawn tube.                       | Width over footplates, $6\frac{3}{4}$ ".                                              |
| Smokebox, 5" diam., 3" long.                                                   | Thickness of frame, $\frac{1}{8}$ " steel.                                            |
| Firebox, $5\frac{1}{4}$ " long, $4\frac{3}{4}$ " wide, depth $6\frac{3}{4}$ ". | Between frames, $2\frac{3}{4}$ ".                                                     |
| Grate, 4" $\times$ 4 $\frac{1}{2}$ ".                                          | Between flanges, $3\frac{5}{16}$ ".                                                   |
| Area of grate, 18 sq. in.                                                      | Weight in working order, 75lbs.                                                       |
| Boiler centre $7\frac{1}{2}$ " above rail.                                     |                                                                                       |



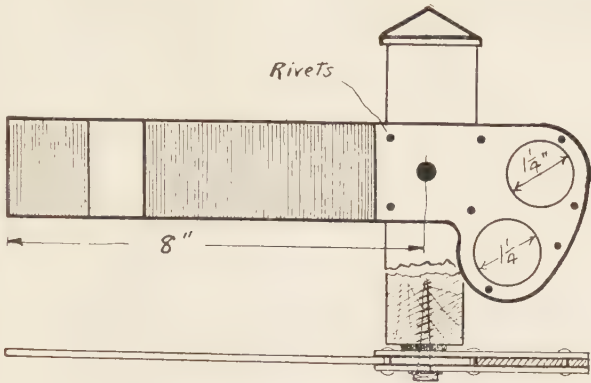


FIG. 14.—SIGNAL ARM.



FIG. 18.—MILE POSTS.

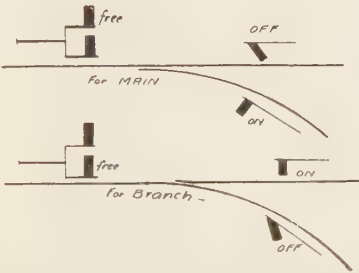


FIG. 16.—DIAGRAM OF SIGNALLING POINTS IN TRAILING DIRECTION.

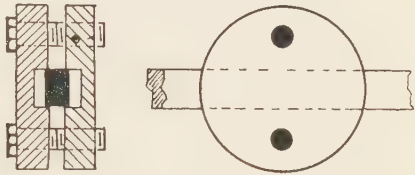


FIG. 15.—SIGNAL WEIGHT.



FIG. 17.—GRADIENT POSTS.

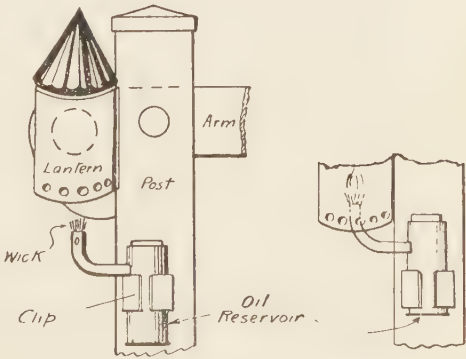


FIG. 19.—SIGNAL LAMP.

So much for Mr. Mitchell's wonderful little tank engine. Both the writer and Mr. W. H. Jubb who accompanied him at the trials, were more than surprised at the performances of this model:  $1\frac{1}{4}$  miles non-stop with one firing was child's play. At the end of the run the "Pop" safety valve went buzz, buzz, buzz, as the driver partially closed the regulator on the down-hill sections of the line, just as merrily as it did at the start.

We now come to the *piece-de-resistance* of the day's programme, viz., the  $1\frac{1}{2}$ " scale railway and its equipment. The general features of the line, starting from the engine house, are as follows:—The track in the engine house



FIG. 19.—VIEW AT SUMMIT OF OUTER CIRCLE, SHOWING ENGINE SHED ROAD AND BOGIE COACH AND LOCOMOTIVE.

is raised up on wooden supports, so that the locomotive can be attended to more conveniently, and runs down a steep gradient over a removable 10-feet length into a cutting 4 feet deep, to West Junction, where it joins the main line by a pair of spring trailing points, which, when the engine returns home to the shed, are held open by a hand lever. From the cutting at West Junction, over one hundred cartloads of earth were removed. West Junction, as will be seen by the plan, is a junction for the short branch connection to Central Junction. The rails then enter the 25-yard long tunnel on the down grade at the commencement. The gradient changes to 1 in 80 up near the end. The line emerges near South Junction—the junction for the inner circle, which, by the way, is laid with two gauges,  $3\frac{1}{2}$ " and  $7\frac{1}{4}$ ". From the level at South Junction, down grades of 1 in 140 and 1 in 210, varied by short 1 in 800 up are negotiated. This part of the line runs beside the lake, and is illustrated in photograph Fig. 3, page 361. A stretch of level line shown in



FIG. 20.—TRAINS APPROACHING EAST JUNCTION FROM THE SOUTH.



FIG. 21.—WEST JUNCTION : LOCOMOTIVE ON ENGINE SHED ROAD WAITING FOR SIGNAL.

photograph Fig. 20 brings us to East Junction, where the inner line, with its dual gauge track, leaves the main to the left. The main line then rises—except for one little dip of 1 in 145—with an average gradient of 1 in 80 to the summit, at which the engine shed road runs alongside, and the loading gauge is fixed.

The Inner circle runs completely round, and from East Junction to the summit between South Junction and the signal box is rising all the way, except for a little piece of 1 in 133 down.

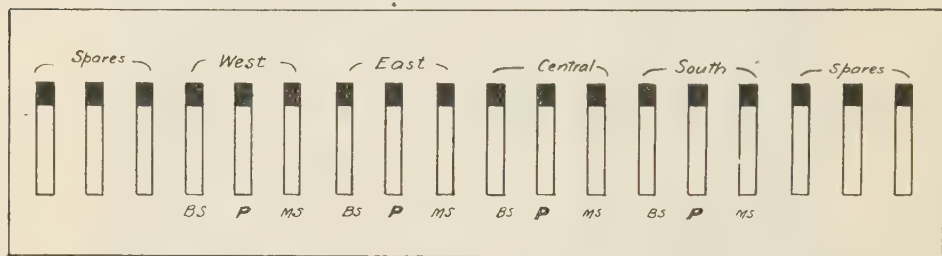


FIG. 22.—DIAGRAM OF SIGNALBOX LEVER FRAME.

The following particulars give full details of the permanent way:—

RAILS.— $1\frac{1}{4}$ "  $\times$   $\frac{3}{8}$ " Bulb iron.

CHAIRS.—Cast-iron with oak keys.

SLEEPERS.—Oak, creasoted:  $14$ "  $\times$   $2$ "  $\times$   $1$ " for  $7\frac{1}{4}$ " gauge;  $18$ "  $\times$   $2$ "  $\times$   $1$ " for dual gauge. Laid 11" centres.

FISHPLATES,  $4$ "  $\times$   $\frac{5}{8}$ "  $\times$   $\frac{1}{8}$ " steel strip, with four  $\frac{1}{4}$ " bolts.

BOTTOM BALLAST.—Crushed ashplate. About 40 tons was used, this material being to hand in another part of grounds.

TOP BALLAST.—Limestone chips—about 8 tons used.

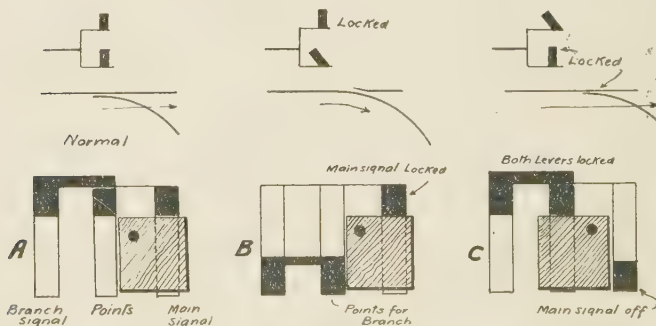


FIG. 23.—SKETCH SHOWING MR. MITCHELL'S INGENUOUS SIGNAL INTERLOCKING DEVICE.

The leading engineering feature of the line is, however, the 25-yard tunnel. This structure is built of brick throughout on proper drums (wooden centreing), with 14" side walls and arch bricks for roof. The height above the rail level is 4', and width inside 3'. Concrete slabs are employed for the copings on



the wing walls outside the tunnel. The whole of the earth—about 200 tons—on top of the tunnel was put there after it was built. The tunnel is drained by 4" land drain pipes passing through the tunnel and cutting underneath the centre of the track.

Five sets of points are employed, four of which are controlled from the box, and the remaining one to the engine shed being worked by a hand lever. The points are connected to the box by  $\frac{1}{4}$ " rods of hard steel, which



FIG. 24.—  
VIEW OF  
SIGNALBOX,  
LOOKING  
TOWARDS  
CENTRAL  
JUNCTION.

will stand treading on without developing kinks. They are nutted together in eight-foot lengths, and run through upright  $1\frac{1}{2}$ " pulleys fastened to the ends of the sleepers. The effects of expansion and contraction, which, as some of the points are over 100 feet from the signalbox, is considerable, is absorbed by springs as shown in Fig. 12. These springs also prevent any damage to the points should a train run through trailing points against the signal—which sometimes occurs when visiting enginemen take charge. The signals are connected to the box with  $\frac{1}{16}$ " (No. 16 S.W.G.) galvanized wire, running round 3" pulleys and through brass screw eyes. The East points and signals are about 120 feet from the box.

The signals are fitted with long springs to compensate for expansion and contraction. These are horizontal, and are covered by a wooden casing, as shown in our diagram. It will be seen that the first portion of the movement of the lever in the box extends the spring, and when so extended to a point of

certain tension, the counterweight on the signal is overpowered, and the signal comes "off." To simplify the system of signalling—a perfect necessary thing in model work, however much may be said to the contrary—all signals which govern trains entering points in a *trailing* direction are worked by the points. Therefore, one signal is always up and the other down, according to the state of the points. The facing signals are worked from the box, and the levers are interlocked in the lever frame in a manner which will be described later.

Sixteen signals are used in all—four bracket signals with two arms for junctions and eight single-arm signals. The posts are  $1\frac{1}{2}$ " square and are made of red deal, with L.N.W.R. type caps. The arms are of  $\frac{1}{16}$ " zinc plate,  $8\frac{1}{2}$ " long from the pivot screw and  $1\frac{5}{8}$ " wide. The spectacles are formed by placing two sheets of proper shape on either of the arms with the glasses sandwiched in between, and secured by small rivets. Our sketch shows the idea more clearly. The openings are  $1\frac{1}{4}$ " diameter. The counterweights at the bottom of the post consist of two iron castings grooved for the lever. These castings are  $3\frac{1}{4}$ " diam.  $\times \frac{5}{8}$ ", and are screwed to the rod by bolts, as shown in the sketch Fig. 15. The pivots for arms, cranks and point cranks, are  $\frac{3}{8}$ " coach screws, those on the ground being fixed to oak posts driven firmly in the ground. The signals are painted white with red arms at front and white at back, with the usual white and black bands. All metal-work, including the rails, point rods, etc., are painted with two coats of oxide paint.

The signals are all lighted at night, the lamps being cheap "bull's-eye" lanterns with a separate container for paraffin. This container is clipped on the back of the post, and has a projecting wick tube. The reservoir slides up and down in the clip, and can be lighted in the position shown in our diagram, and then pushed up into the lantern. Mr. Mitchell informed the writer that he tried nightlights, but without success. The gradient boards are 12" long by 2" wide, of  $\frac{3}{8}$ " wood, and are fixed on to  $1\frac{1}{2}$ " square posts.

However interesting all these details are, nothing surpasses the signalbox and its internal arrangements. By obeying the ordinary laws of signalling and by codes of hand flag-signals (red and green lamps at night), and engine whistles, there is no need for the driver and signalman to say a word to each other to enable the latter to safely control trains in any desired direction, within the capabilities of the line. At our visit we performed all kinds of evolutions, and at one time had the  $\frac{3}{4}$ " scale tank engine and the large  $1\frac{1}{2}$ " scale loco working together, and, except when one of the visiting engine drivers ran past a signal, no danger of a disastrous collision occurred. We recorded this event in a photograph and suspended the driver.

The arrangement of the eighteen signal levers in the box is shown in the accompanying diagram. They are in four groups (with two spare sets in addition) controlling West, East, Central, and South Junctions, respectively. The levers are of wood,  $1\frac{1}{2}$ "  $\times$   $\frac{3}{4}$ " section, with a built-up bell-cranked lower end. They are 3' 3" long, spaced  $3\frac{1}{2}$ " between, the length of the frame being 5' 7". The signal levers are red, and points blue, the spares being painted white. Small brass barrel bolts are employed to hold them in position.

The signalbox is 7' 6" long  $\times$  4' wide outside, and is 6' high to the eaves. It has a platform in front for flowers and is lit by a paraffin lamp at night. The box has proper sliding windows, and is equipped with red and green flags and a guard's lamp for night work. Each group of signals is interlocked in itself. The method employed is simple in the extreme, but although it only took a few minutes to make and fix, it cost Mr. Mitchell much thought before he arrived at so satisfactory a solution of the difficulty. It consists of a

square piece of  $\frac{3}{4}$ " hard wood, pivoted as shown to the lever frame, and with the commonly fitted bracket piece on the back of the branch signal lever, this describes the whole apparatus. It will be seen from the diagram in Fig. 23 that at A the point lever or the main signal lever is free. If the points are pulled as at B, the branch signal, which is governed by the bracket on the back of the lever embracing the back of the point lever, so butts against the piece of pivoted wood that the main line signal lever cannot be pulled. In diagram C the main line signal has been pulled. This turns the pivoted wood into such a position that the points cannot be pulled over for the branch while the main signal is "off," the bracket piece on the back of the branch signal lever also locking this lever. Could anything be simpler or more effective? Of all the interesting things Mr. Mitchell's handiwork provides, this piece of apparatus has pleased the writer most, and he congratulates the "engineer-manager" of the "Brook House" Model Railway on his ingenuity.

A few other useful particulars of the B.H.M.R. may be gleaned from the following tabulated statement, kindly supplied by Mr. Mitchell:—

LOCOMOTIVES.— $3\frac{1}{2}$ " gauge tank engine, designed and made by Mr. Mitchell.  $3\frac{1}{2}$ " gauge G.N.R. 251, from designs by the writer. Built from Stuart Turner's castings; fired by coal, and pulls 25 stones easily.  $7\frac{1}{4}$ " gauge "Precursor," designed by the writer, and described in *Model Railways* of April last; purchased from Bassett-Lowke Ltd., Northampton.

COACHING STOCK.— $7\frac{1}{4}$ " gauge double bogie wagon, purchased from Mr. Gerhartz; spring suspension altered to suit the specially sharp curves.  $7\frac{1}{4}$ " gauge ballast truck, made by Mr. Mitchell.  $3\frac{1}{2}$ " gauge driving truck for tank engine, with water and coal space (Mr. Mitchell's design and make).

FUEL for all engines, 3-parts coke and 1-part anthracite coal.

SUPERELEVATION.—On 40' radius curves,  $\frac{3}{4}$ ". On 25' radius curves, 1".

LENGTHS OF LINE.—Main line, 439 feet; inner line, 330 feet; connecting line, 62 feet; engine shed line, 110 feet.

SPEEDS.— $3\frac{1}{2}$ " gauge tank engine, up to 7 miles per hour.  $7\frac{1}{4}$ " gauge "Precursor," up to 12 miles per hour.

In both  $1\frac{1}{2}$ " and  $\frac{3}{4}$ " scale models, steam-raising is done in the engine house by means of a 3" chimney, 20' high, running through the roof of the engine shed. This pipe has a removable bottom piece, which drops over the engine chimney. The pipe is warmed first by a Bunsen gas burner placed in the smokebox through the opened door, and when thoroughly warmed, the door is shut, and fire started with wood. It will then draw quite well until sufficient steam is raised to work the blower. At his visit, the writer found that steam could be raised in the  $1\frac{1}{2}$ " scale engine by simply projecting the Bunsen in the fire door, after, of course, the preliminary warming of the chimney flue.

The mile posts are illustrated in Fig. 18. They have  $1\frac{1}{2}$ " square posts with a 4" square board fixed on the top as shown. They are fixed at scale distances of  $\frac{1}{8}$  of a mile, i.e.,  $\frac{1}{8}$  of  $\frac{1}{8}$  of a mile apart, viz., 82 feet apart.

This the writer thunks fully describes the construction of the B.H.M.R., which has occupied the whole of Mr. Mitchell's available time for the past six or seven months, and had only been completed a few weeks before Mr. Jubb and the writer were invited to inspect it. Needless to say, we enjoyed ourselves immensely and the writer feels sure that our readers will join him in thanking Mr. Mitchell for the trouble he has taken in providing most of the photographs and dimensions for this article.

(To be continued)



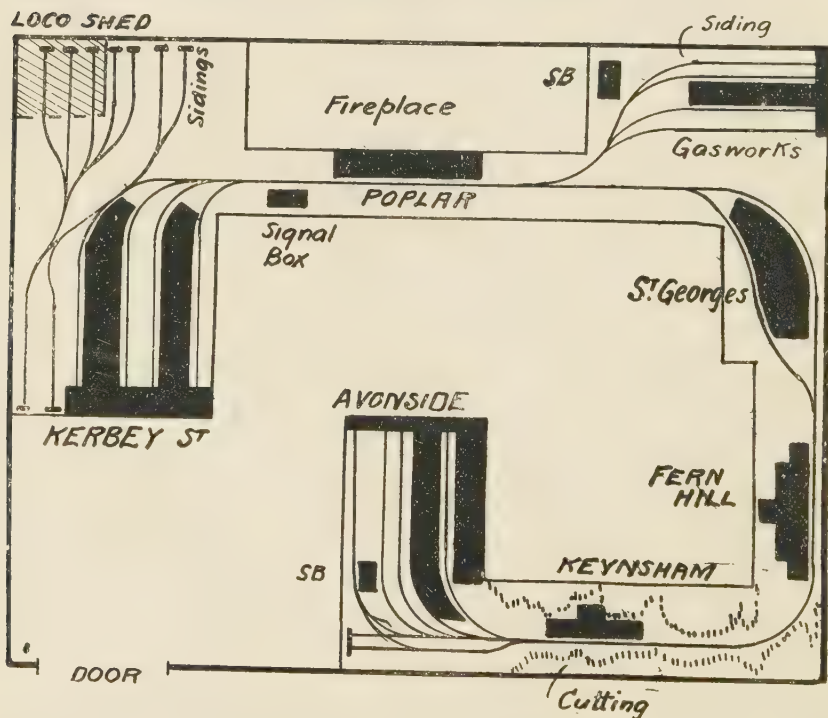
### THE SOUTH BRITISH MODEL RAILWAY.

TO THE EDITOR *Model Railways and Locomotives.*

DEAR SIR,

You will find enclosed photographs of trains and locomotives of the above model railway, which has had rolling stock built in three gauges, viz.,  $1\frac{1}{4}$ ",  $1\frac{3}{4}$ " and the 2", the gauge now adopted.

### PLAN of MODEL SO. BRITISH. RLY



This model railway was first built about ten years ago, to the  $1\frac{1}{4}$ " gauge, in a room  $12' \times 9'$ ; the line was laid on a shelf about  $3' 6''$  from the floor. As can be seen from the plan, it was a single line, with a passing place and sidings; there was also a branch station. Three signal boxes controlled the line, one at each terminus, and one at the branch station.



There were seven stations, the principal being "Kerbey Street" (the London terminus), "St. George's" (the passing station), and "Avonside" (the south-west Atlantic port station).

The permanent way was laid with "Tessted" tin-plate rails, most of the points being home-made, as were all the signals and stations.

Ten locomotives worked the line, nine clockwork and one steam. All except the steam locomotive were built at the "company's" works (the clockwork and wheels being taken from the German type locos); all were tanks, both side and saddle, with one exception—a powerful tender loco with single driving wheels; this used to work the fast passenger trains. For goods work a six-coupled saddle tank is employed.

The photograph Fig. 2 shows six-coupled side tank No. 4 with a passenger train, passing through Keynsham cutting. The cutting was removed bodily for the photos to be taken in the garden, as a more natural effect is obtained

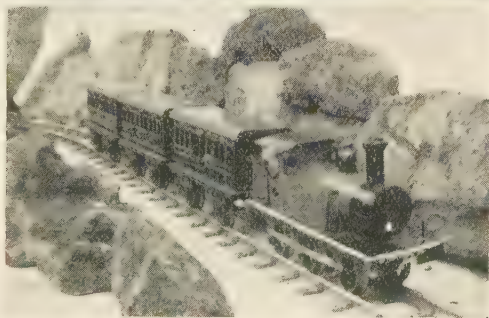
FIG. 1.—

MR. S. GROVES' MODEL  
2-4-0 TYPE STEAM  
TANK ENGINE.



FIG. 2.—

MR. GROVES' MODEL  
SIX-COUPLED SIDE-TANK  
ENGINE IN  
"KEYNSHAM CUTTING."



than by flashlight. The rolling stock consisted of six passenger carriages and two brake-vans, and a large assortment of trucks, etc.

The railway continued in use for over five years, when it had to be taken to pieces, as the space was required. It was then proposed to rebuild the line to the  $1\frac{3}{4}$ " gauge, and some trucks and a small tank locomotive were built experimentally. This was the first steam locomotive built by me, and from which I learnt many of the improvements embodied in later locomotives. It was made from sheet brass, and had an externally-fired copper boiler, which is fitted with gauge glass, whistle and regulator. It was made from the design on page 35 of that valuable book *The Model Locomotive*, by Mr.

H. Greenly, and is driven by a single cylinder with slip eccentric reversing gear (see illustration Fig. 1). This gauge proved too cramped for a good working model of a small tank engine, so we have decided to adopt the popular 2" gauge, and construct an outdoor line around the garden. I have built a contractor's saddle tank loco to this gauge (see photo Fig. 3), which is driven by the clockwork from one of the 1 $\frac{1}{4}$ " gauge locomotives. The reversing lever can be seen on the left side of the smokebox.

Much instructive amusement can be obtained in building the earthworks, bridges, etc, with such a small loco, a few tipping trucks and some temporary



FIG. 3.—MR. S. GROVES' MODEL CONTRACTOR'S SADDLE TANK.

track. The latter we shift about to any part of the garden where the particular material required is abundant.

I am also building a powerful six-coupled saddle tank with outside cylinders, and a six-wheeled front coupled side tank with outside-fired brass boiler. I hope to send photos of these when finished, also an illustrated description of the completed railway.

I may add that I had only just left school when I started building the 1 $\frac{1}{4}$ " gauge line, and had but few tools. There were then no splendid scale models such as can be obtained to-day—thanks to the efforts of our Editor and a few others. Wishing the best of success to "ours" in its new role,

I remain, yours faithfully,

POPLAR, E.

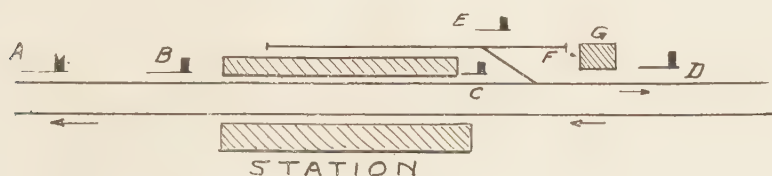
SAMUEL E. GROVES.

TO THE EDITOR *Model Railways and Locomotives*.

DEAR SIR,

In your September issue I notice that you say "the notable feature about the new L.N.W. "Precursors" is that they are fitted with super-heaters." I should like to point out that "Queen Mary" has not got a super-heater but a system of feed-water heating.

In your September issue J.F.S. writes about block system sections. In the first place every cabin that works signals must be a block cabin, and a ground frame (point cabin) must be in communication with a block cabin by the block instruments, and the levers in the *ground frame* are interlocked with the *block cabin* levers. If there was a siding joining the main at C (on J.F.S.'s plan) outside the starter there would be a distant, inner and outer homes and a starter :



A is the distant.

B, the outer home.

C, the inner home.

D, the starter.

E, the bay starter.

F, the trap-point required by the Board of Trade.

G, the cabin.

If the distance between A and C or C and B is more than three miles, a small cabin with a home distant for each way would be provided for when the traffic is heavy.

Yours truly,

J. WARD.

LYTHAM.

[With reference to the new L.N.W.R. engines, our information at the time, which was official, did not make the distinction. We think our correspondent must make allowances for the difference in various companies' practices. We do not see any mis-statement in our reply to J.F.S. ; we can take Mr. Ward to a station so equipped ; but at the same time Mr. Ward's plan is quite correct for an ordinary double line of railway, and represents the best practice.—EDITOR *Model Railways*.]

## ANSWERS TO CORRESPONDENTS:

E. S. M. (Redditch).—We are bearing your suggestion in mind, and will insert in a future issue a drawing of the G.W.R. steel box wagons. This drawing has been measured up from an actual example. Please send along some definite requirements as to scale of model.

J.B.B. (Purley).—The L.B.S.C.R. engine you have seen with a second dome, near to the chimney, is one of the same class as illustrated in this issue. viz., No. 53 "Richmond." This dome covers the "Hotchkiss" patent circulator which has lately been fitted.

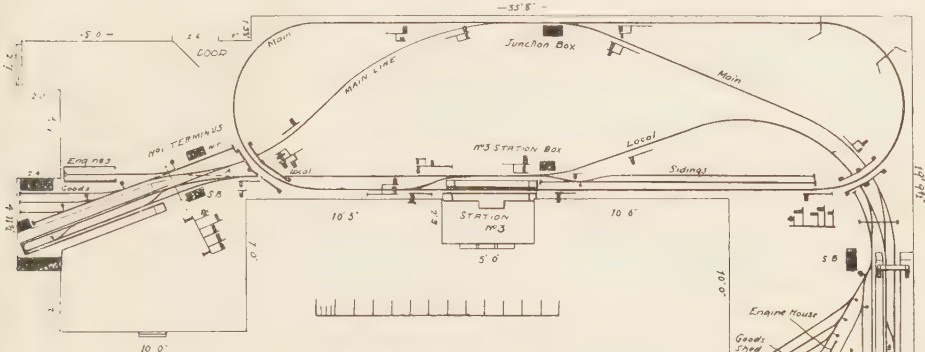
A. G. (Belmont).—Many thanks for photograph.

F. E. C. (Stroud Green).—We are obliged for your explanations of what might happen at Bishop's Stortford. We will deal with the scale model clock suggestion later on.





must be carefully worked out, so that the main line has no grades steeper than say 1 in 20 or 1 in 25. Station No. 3 and the junction box may be on a lower level than the bridges, so as to ease the gradient from the stations. The crossover at station No. 3 from the "local" line of course makes this portion of the line steeper, but if the engines are suitable to the particular purpose there should be no difficulty in hauling the trains. The main line (the oval portion) between station No. 3 and the bridge at No. 1 terminus may rise, say, 2", which will give a grade of about 1 in 35. The local line will then have to fall 5 inches in 10 feet, from the station No. 3 to under the No. 1 bridge. This is a grade of

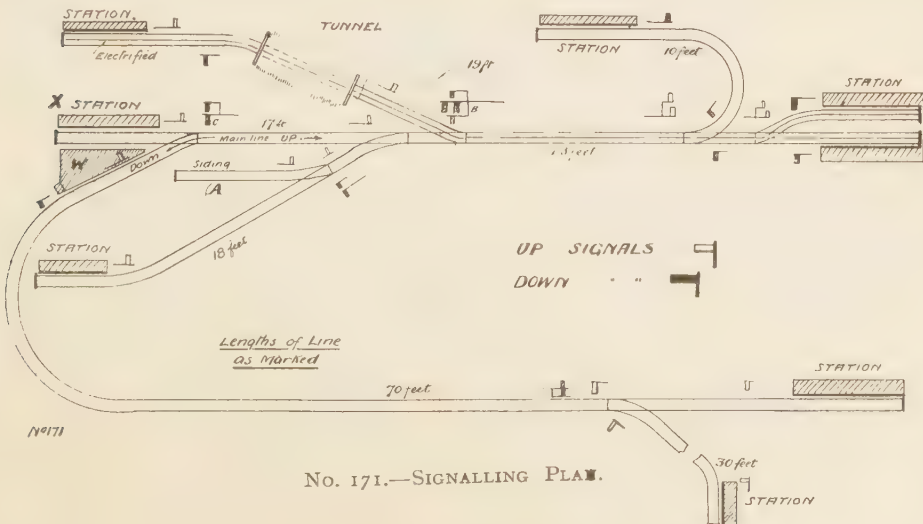


NO. 173.—PLAN FOR A NO. 1 GAUGE RAILWAY IN A LARGE ATTIC.

1 in 24. The plan is an interesting one, although perhaps somewhat ambitious. It will enable you to work two trains over what is virtually a single line. One train may be sent round the main line, and, following this, local trains may be worked between the terminus stations *via* the local line. The local line is provided with a couple of long "refuge" sidings for goods train. Each terminus has a goods marshalling yard and an engine shed. A turntable is hardly necessary, as light engines may be reversed by running them round the track. The signalling is fairly simple, considering the comparative complexity of the system. The minimum radius on the main line is 4' 6". The points of the marshalling sidings may be the standard 3-foot radius.

#### DIFFICULTY NO. 171.—SIGNALLING PLAN.

H. M. (Muswell Hill) writes:—Would you mind answering through your columns in *Model Railways and Locomotives*, or by post, a question regarding signalling. I enclose



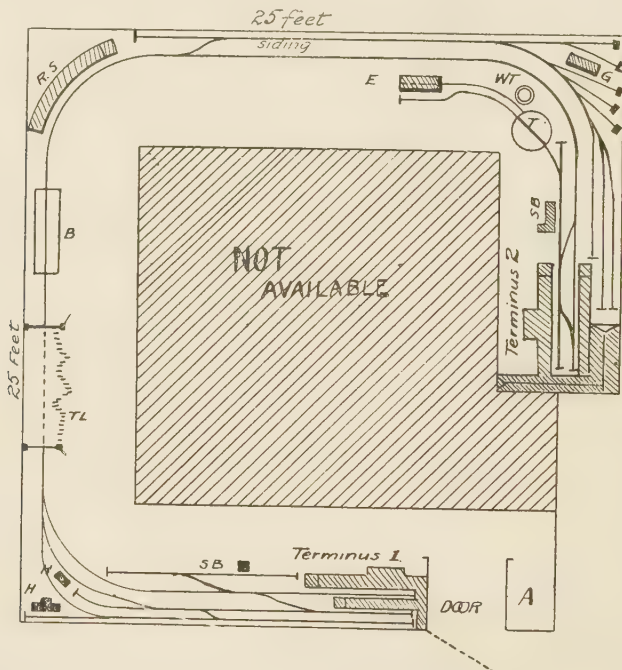
NO. 171.—SIGNALLING PLAN.

a plan of my line, and would you kindly fill in the signals necessary for same, irrespective of how they are to be operated.

We append a plan of the signals, and have omitted all distants, except at B, which is intended to be a repeater for the main line signal (down journey) at C. We should dispense with siding A, if possible, making it some part of station X. We of course know nothing of the local conditions of the line, and therefore in fixing any distant signals, such conditions must be carefully considered. We have added another platform (W) to station, so this now serves the main line.

#### DIFFICULTY NO. 172.—PLANNING MODEL RAILWAY.

T. D. H. (Winchester) writes :—I wish to lay out a No. 0 gauge railway in an attic, a sketch of which I enclose below. In your next issue could you possibly give a suggestion for the plan of it. I do not intend to lay it out all at once, but by degrees. Your paper is most interesting and useful; I have got many a tip from it.



No. 172.—NON-CONTINUOUS RAILWAY PLAN.

We reproduce herewith what we think will prove a suitable plan. As we have not exact particulars of the nature of the site of the proposed model railway, we cannot advise in a very definite manner. It would appear, however, that the space behind the door (A) is hardly any practical use unless you can bridge the doorway with the terminus. You also have plenty of room for No. 1 gauge, or even No. 2. A continuous line does not appear possible; we have therefore suggested a single line with two termini and a roadside station in between. The features of the plan are :—

No. 1 and No. 2, Terminus Stations.  
RS, Roadside Station.  
SB, Signalboxes.  
B, Bridge.  
WT, Water Tower.

E, Engine Sheds.  
H, Huts and Buildings.  
T, Turntable.  
TL, Tunnel.  
G, Goods Shed.

These of course may be modified to suit circumstances.

**NEW CATALOGUES AND PRICE LISTS.**



**MESSRS. BASSETT-LOWKE, LTD.,  
LONDON AND NORTHAMPTON.**

THIS year Messrs. Bassett-Lowke are issuing their main list in two sections; section C/43, or the railway section, will be ready early in November. This list embodies all the new lines up to date, and comprises 200 pages got up in the usual high-class style. The special feature is a coloured plate of the L.N.W.R. "Black Prince" and the G.W.R. "County" class, reproduced direct from the 2" gauge engines by four-colour process. The catalogue will be sent post free for 4d., and our readers no doubt will anxiously await its publication.



**C. W. BURTON GRIFFITHS & CO.,  
LUDGATE SQUARE, LONDON, E.C.  
(And at Manchester and Glasgow.)**

HALF of the pleasure obtained from a model railway or locomotive is either obtained in the building, or by adding some accessory which will increase its efficiency. But such work requires tools. As a catalogue of small tools of the kind which the amateur needs more particularly, Messrs. Burton Griffiths' List No. 14B is one of the handiest, most comprehensive and well got up we know. Its four hundred pages are crammed full of useful information, illustrations, and prices of all kinds of small tools and we strongly recommend all our readers to make the necessary investment of 1/6 to obtain possession of a copy, which sum will be refunded on the first order amounting to 20/- or upwards.



**MESSRS. ARMSTRONG & CO., FARADAY WORKS,  
TWICKENHAM, LONDON, S.W.**

THE name of Armstrong & Co., of Twickenham, is well-known to all users of accumulators, and the lists we have received are evidence of the enterprise of this firm. The main catalogue comprises full particulars of many types of accumulators made by Messrs. Armstrong, the portable accumulator section perhaps being the most interesting to the builder of a model railway. The special acid-proof accumulators on page 12 will more particularly appeal to those who desire a good accumulator for locomotive driving, but where cells need not be moved about, the small open cells in glass cases described on page 10 are worthy of consideration. The various types of dynamos, motors, electric lamps, volt and ampere meters included in the list are also items which will interest our readers. The list with its supplement will be sent to any address on receipt of four penny stamps.



### SCOTT HOMER, CRADLEY, STAFFS.

In Messrs. Scott Homer's catalogue, illustrations and prices are given of all kinds of model steam engines, gas and oil engines, and dynamos suitable for power purposes for model railways. In addition, the list includes particulars of boiler and engine fittings, pumps, electrical accessories, and small tools. The list will be sent to our readers on receipt of three stamps, and to foreign readers free.

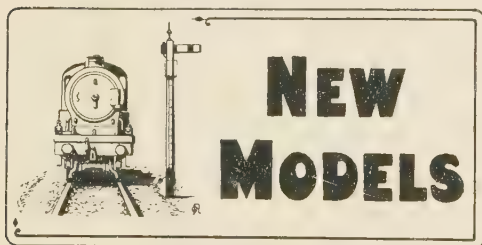
### SIEMENS BROTHERS' DYNAMO WORKS, LTD., TYSSSEN STREET, DALSTON, N.E.

We have received a copy of catalogue giving full particulars of the "One Watt" metal filament lamps for low voltages. We can recommend all readers who intend to fit up electric light to model railway buildings or vehicles to consider this catalogue.



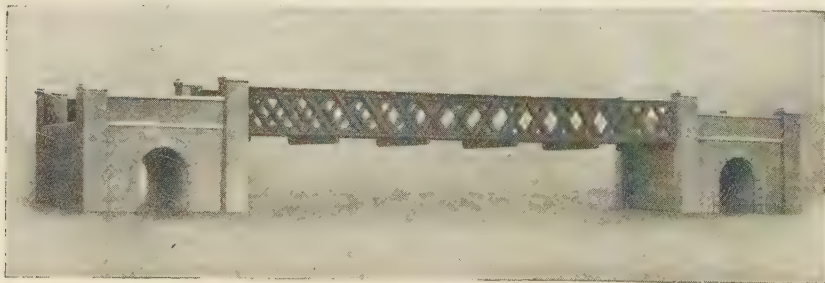
### WM. F. BOND, 245 & 247 EUSTON ROAD, LONDON, N.W.

We have received Mr. Bond's list of electrical appliances and materials for amateurs, and we would recommend our readers who are requiring electrical accessories for their model railways to send three stamps for this well got up catalogue.



### THE LATEST ACCESSORIES OF MESSRS. BASSETT-LOWKE, LD.

THIS firm have just lately increased their range of model railway accessories by numerous designs for model wagons in No. 2 gauge. These include bogie open wagons with American bogies, bogie covered vans, and N.E.R.



brake-vans. The bridge illustrated above is one of the new model bridges with lattice girders built up of wood strips. Other new accessories are point lamps for "Lowko" track, brake stops, station overbridges, and additions to the model passengers for railway platforms.





# MODEL RAILWAYS AND LOCOMOTIVES

A Monthly Journal devoted to Model Railway construction and working.

— Edited by —

HENRY GREENLY.

Editorial and Advertisement Offices—

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Vol. II., No. 12.

DECEMBER, 1910.

## TO OUR READERS.

OUR SECOND SPECIAL RAILWAY NUMBER needs little introduction to those readers who have supported us so well in the past, and the choice of the Caledonian Railway will, we think, be welcomed by all.

To explain the aims and objects of our Journal to those who may have only just crossed our path, we may say that our existence is fully justified by the immense interest taken in railways by the makers of models. We provide a medium for the interchange of ideas on all subjects involved in the building of a model railway, and if new readers will take an opportunity of referring to the descriptions of model locomotives, working drawings, plans, and information relative to model railway construction which we have published in the past, we think amount of time, thought and examples of model handiwork. is well known to all. There is educational value of a model mind of the younger generation. from the cares of business that for the older boys. To assist duction of railway appliances diverge from our "settled policy" products of one railway. As a issue, we hope to see our readers company's most interesting signals and other engineering their respective makers, will be sufficiently encouraging to ourselves.



they will be surprised at the skill that can be put into such The fascination of the locomotive no need for us to dilate on the railway or locomotive to the Then there is the relaxation the building of a model provides our readers in the realistic repro- and operations, we at times and deal exclusively with the result of the "Caledonian" making accurate models of this ocomotives, stations, bridges, features, which, if they satisfy

We have to thank the officers of the Caledonian Railway who have so ably assisted us in preparing this issue for the press. At all times they have been obliging and courteous, and we are sure our readers will appreciate their efforts to provide interesting information relative to the "Premier Line of Scotland." We only regret that we have not been able to use all the valuable information with which we were provided, but possibly we shall be able to publish some of it in a future issue.

Our next number—the first of Volume III.—will continue the useful article on "Model Railways in Sheffield." The centre plate will consist of the working drawings of a model 2" scale trailing bogie tank built by a private model maker of experience. There will also be further designs for building clockwork locomotives, new ideas for moving points by electricity, and other features interesting to the model railway enthusiast.

We have now settled into our new quarters at Aldine House, Crown Court, Chancery Lane, to where ALL letters should be sent relative to our Journal.

## THE CALEDONIAN RAILWAY.

It is with no apologies that we present herewith to our readers a further "special" number, dealing in this instance with the Caledonian Railway, or, to give it the more popular appellation—the "Caley." A good many reasons underlie the deserved popularity of this prosperous company; the fact of its alliance with our London and North-Western Line, as forming the northern section of the "West Coast Route," would probably alone be accepted by many—especially by the L. & N.W.R. enthusiasts—as sufficient evidence of its "standing" in the railway world. Beyond this, however, the Caledonian Railway has many claims on our readers' consideration and interest: its locomotive practice has always been marked by exceptional excellence and originality of design, so much so as to be copied in detail by a foreign country; its modern rolling stock has practically been the means of effecting a revolution in the comfort of internal Scottish travel, excelling



THE FIRST BOOKING OFFICE  
CALEDONIAN RAILWAY.

TOWNHEAD STATION, GLASGOW,  
1831.

even that of the West Coast Route; while in such matters of enterprise as high speed the Caledonian, as is well known, has always taken a leading place in Great Britain, and can lay claim to not a few noteworthy speed records.

The Caledonian Railway awoke to a corporate existence in 1845, the necessary attendance on its birth costing no less than £70,000, this sum representing the fees swallowed up in the fierce and protracted struggle which preceded its incorporation. A total length of 122½ miles was authorized, from Carlisle to Edinburgh, Glasgow and Castlecary (near Larbert), but, on opening, two old lines—the Glasgow, Garnkirk and Coatbridge, incorporated in 1826, and the Wishaw and Coltness, incorporated in 1829—were amalgamated with the new undertaking, making its total length 144 miles. The first portion of the new line—the 40 miles from Carlisle to Beattock—was opened on September 10th, 1847, and the completed whole to Glasgow and Edinburgh on February 15th, 1848. Seeing that the first sod has only been cut on October 11th, 1845, the celerity of construction for this early period was remarkable. The late Thomas Brassey was one of the contractors for the line. Two other important lines were at a later date amalgamated with the Caledonian—the Scottish Central, extending from Castlecary to Perth and Dundee, and the Scottish North-Eastern, which ran from Perth and Dundee (*via* Alyth) to Forfar and Aberdeen. Thus the incorporation of these three large systems into one whole resulted in the formation of the "back-bone" of the Caledonian Railway from Carlisle to Stirling, Perth and Aberdeen, a total distance of 240½ miles.





In addition to this extensive mileage, which also includes a complicated ramification of lines and branches in the neighbourhood of Glasgow, the Caledonian maintains and works a number of additional independent lines of considerable importance. Among these are the Callander and Oban line, with its recent extension from Connel Ferry to Ballachulish, and its branch from Killin Junction to Killin (Loch Tay), the Lanarkshire and Ayrshire Railway, and the Brechin and Edzell District line. The Caledonian Company is joint owner with the G. & S.W.R. of the Glasgow, Barrhead and Kilmarnock Joint line, and with the N.B.R. of the Dundee and Arbroath Joint line, but is now making arrangements to cede the working of both these lines to the other companies concerned, in place of the joint working previously existing, as in both cases the joint lines form portions of the through main lines of the G. & S.W.R. and N.B.R. respectively, and can thus be more suitably and economically worked by the latter companies. The Caledonian Railway also jointly owns and works with the G. & S.W.R. the Glasgow and Paisley Joint line, and the Glasgow and Renfrew District Railway; and with the North British the Dumbarton and Balloch Joint line, together with the Loch Lomond steamers. The Portpatrick and Wigtownshire Railway is joint between the Caledonian, G. & S.W., L. & N.W. and Midland Railways, but owns its own locomotives and rolling stock. Of stations, the Citadel Station at Carlisle is joint L. & N.W. and Caledonian property; the General Station at Perth, Caledonian, Highland and North British; and the Joint Station at Aberdeen, Caledonian and Great North of Scotland. It may be mentioned finally that the Caledonian Railway owns the extensive Grangemouth Docks, and also the  $52\frac{1}{4}$  miles of the Forth and Clyde and Monkland Canals, the purchase of which was necessitated by the acquirement of the docks.

The geography of the Caledonian line is a little complicated, especially in its central region. Leaving Carlisle, beyond a few branches which join the main line, such as that from Brayton (Cumberland) at Kirtlebridge, from Dumfries at Lockerbie, from Moffat at Beattock, and from Peebles at Symington, the main line continues in comparative isolation to Carstairs,  $73\frac{1}{2}$  miles out, where the Edinburgh line diverges to the right, running for another  $27\frac{1}{2}$  miles into Princes Street Station. Continuing northwards from Carstairs to Motherwell, a distance of 15 miles, the main Glasgow line into the Central Station leaves us on the left for a  $13\frac{1}{4}$ -mile run *via* Uddington. Passengers between Edinburgh and Glasgow are not, however, conveyed *via* Carstairs, but by a direct line which runs from Uddington, beyond Motherwell, to Midcalder, between Carstairs and Edinburgh, reducing the distance by 10 miles. The other ramifications round Glasgow are too complicated for description here, but the principal branches are those to Greenock, Gourock and Wemyss Bay, and to Ardrossan. Meanwhile the main north line continues, joined at Mossend by a "loop" from Law Junction *via* Holytown, passing Coatbridge, and joined again at Glenboig by the main line from the Buchanan Street terminus at Glasgow. At Larbert,  $36\frac{1}{4}$  miles from Carstairs, after passing an almost record number of junctions with the veritable maze of lines which honeycombs this mining and manufacturing region, we are joined by the North British line from Edinburgh, *via* Falkirk, over which the Caledonian expresses to the north have running powers, as also the trains to and from Grangemouth. Shortly beyond we reach the historic town of Stirling,  $117\frac{3}{4}$  miles from Carlisle.

At Dunblane, 5 miles further, the Callander branch diverges to the left,



the metals of the Callander and Oban line continuing thence through the wild Western Highlands through Crianlarich to Dalmally (Loch Awe) and Oban, with a branch from Connel Ferry to Ballachulish. The latter village is only 11 miles from Fort William, and is the nearest point to the important aluminium works on Loch Leven. Continuing along the main line, at Crieff Junction the Crieff branch diverges, with its recently constructed extension along the shores of Loch Earn to Comrie, St. Fillan's and Lochearnhead, joining at Balquhitter the Oban line, and thus forming a complete loop. Perth is 33 miles from Stirling, and  $150\frac{3}{4}$  miles from Carlisle, the latter distance being the longest non-stop stretch scheduled on the Caledonian line. The Dundee branch here leaves on the right, running through the fertile



THE WEST COAST  
JOINT STOCK CREST.

(Caledonian and L & N.W.  
Railways).

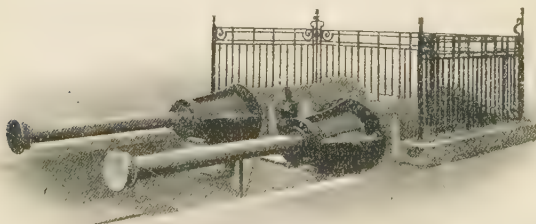
Carse of Gowrie to the town of "marmalade"—and other productions. The main line now continues for  $89\frac{3}{4}$  miles to Aberdeen *via* Forfar and Stonehaven, branches of less importance leaving at Coupar Angus for Blairgowrie (the start of the famous Braemar coach tour), at Alyth Junction for Dundee, at Forfar for Broughty Ferry and Brechin, at Guthrie for Arbroath, and at Dubton Junction for Montrose. Just beyond the latter station is the historic Kinnaber Junction, where the North British main line joins the Caledonian; the N.B. Co. has running powers from this point into Aberdeen, and great excitement always centred round this point in the memorable race to Aberdeen of 1895, as to which of the competing trains would pass the junction first.

Although total mileage is not altogether an index of the prosperity of a railway Company, its actual size is nevertheless an important feature, and in this respect the "Caley" takes eighth place in the British Isles, ranking behind the G.W.R., L.N.W.R., N.E.R., Midland R., and G.E.R. in England, the N.B.R. in Scotland, and the G.S. & W.R. in Ireland. As regards total length of main line and sidings reduced to miles of single track, however, it takes fifth place, being only surpassed by the four first-named companies. The capital of the Caledonian Railway is £55,471,108; the expenditure for the year ending July 31st, 1909, £2,366,029, and the receipts £4,355,817. The "Caley" is therefore one of the most economically worked lines in the country, with a proportion of expenditure to receipts of only 54 per cent., and was able, in a time of great trade depression, to declare for the year mentioned a dividend of 3 per cent. on the ordinary stock. During this year the total number of passengers carried was 36,049,765, excluding season-ticket holders, necessitating a passenger train mileage of 9,689,090; the total

tonnage of goods and minerals conveyed produced a further mileage of 6,507,407, the grand train mileage total being thus 16,196,637 miles. As regards rolling stock, the total quantity owned by the Caledonian Company on July 31st, 1909, was as follows:—927 engines, 606 tenders and one rail motor; 265 first-class, 1,306 third-class and 353 composite and saloon coaches; 515 other coaching stock vehicles, and 61,811 goods vehicles of different kinds.

The principal features of note in connection with the past history of the Caledonian Railway have been those connected with speed. On the last day of the historic Race to Aberdeen of 1895, when the West Coast train achieved the marvellous feat of covering the 540 miles from Euston to Aberdeen in 512 minutes—an average speed of 63.3 miles per hour, including four stoppages and the tremendous climbs to Shap and Beattock—the last stage of the journey from Perth to Aberdeen was covered at a sustained average speed of 67.79 miles per hour over an undulating road. Again, the Caledonian management was the first to institute an express train booking in this country at over the mile-a-minute average speed, the express in question being booked to run from Forfar to Perth, 32½ miles, in 32 minutes. Our friends north of the Border have good cause to be grateful to the “Caley” for the introduction in 1905 of the celebrated “Grampion Corridor” expresses, with their rolling stock of a luxury even yet almost unsurpassed; competing companies have thus been compelled to come into line, more especially as the use of the same stock has been extended to all trains on the Glasgow and Aberdeen service, to the Edinburgh-Glasgow service, and to that in operation to and from the Clyde Coast resorts.

These introductory remarks will receive amplification in the articles following descriptive of the locomotives, rolling stock, engineering, permanent way, signalling and general details of one of the most progressive and enterprising lines in the British Isles—the Caledonian Railway. We are indebted for many of the interesting historical details mentioned herewith to the *Railway Magazine* and the *Railway Year Book*.



HYDRAULIC BUFFER STOPS,  
CALEDONIAN CENTRAL STATION, GLASGOW.

**THE EXPRESS TRAIN SERVICES OF THE CALEDONIAN RAILWAY.**

BY CECIL J. ALLEN.

THE subject which we have before us in the present article is one which has, it must be confessed, a somewhat melancholy aspect in addition to its many features of interest. It seems almost difficult to realise that, in these days of progress, a town which was brought within  $8\frac{1}{2}$  hours of London no less than fifteen years ago should now be  $11\frac{1}{2}$  hours distant by the fastest passenger train, and over 12 hours by all others. Yet such is the case with Aberdeen, which was reached in the great race of 1895 in 512 minutes, although 540 miles from the Metropolis, while the very same train now occupies 11 hours 38 minutes on the journey. Yet this must not be blamed on to the Caledonian Railway, which is merely a party to the agreement entered into by the five companies constituting the East and West Coast Routes that the times between



ONE OF THE "140" CLASS AT WORK.

London and Scotland shall not be cut below certain minimum figures. With a view to better the time-keeping, now that train-loads have so vastly increased, and also to a reduction of working expenses and consequent benefit to the shareholders, such an arrangement is doubtless beneficial, yet one cannot help thinking that, from the standpoint of the travelling public, although the acceleration of the night services is not so necessary on account of the unduly early times of arrival that would thus be incurred, the time has come to expedite the day express train services between London and Scotland above their present somewhat mediocre average speed.

Before the general deceleration took place, the Highland express was

nightly booked to cover the  $117\frac{3}{4}$  miles from Carlisle to Stirling in 125 minutes, and, not only so, but to make the run without an improvement of schedule was officially considered "poor." The late Mr. C. Rous-Marten records many occasions when, with train loads up to 150 tons, Beattock summit,  $50\frac{3}{4}$  miles out of Carlisle and 1,014 feet above sea-level, was passed in 53 minutes, or even less. The fastest daily schedule time to the summit is now 60 minutes, and to Stirling during the summer 137 minutes, although with far heavier loads, it must be admitted, while the latter run also includes a stop at Beattock Station in order to attach a bank engine in the rear to assist in the climb. The racing abilities of Caledonian express engines, however, still find ample expression in many lightning runs, particularly those made over the level main line stretch between Perth and Forfar. The down tourist express for Aberdeen (8 p.m. ex Euston) during the summer months covers the  $32\frac{1}{2}$  miles from Perth to Forfar in 33 minutes—



THE GRAMPIAN  
CORRIDOR  
EXPRESS.

average 59.1 miles per hour—while the reverse run is daily made by the evening up "Grampian Corridor" express in 32 minutes, this average speed working out at 60.9 miles per hour, and being the second fastest booking in the kingdom. The latter is a remarkable run for so short a distance, and took first place in the British Isles for speed until the North-Eastern 43-minute "flier" was instituted; the booking includes a passing schedule of 25 minutes from Kirriemuir Junction to Almond Valley Junction, entailing the high average speed of 67.2 miles per hour for this distance. One thing is certain that, just as the progressive management of the Caledonian Railway cannot be held in any way responsible for the present long-distance decelerations, so the Caledonian locomotives are more than equal to whatever acceleration the future may have in store.

The fastest train at present running on the Caledonian system is the famous "Postal Express" (8-30 p.m. ex Euston), which, for the major portion of its journey, does not convey passengers. This train is one of the few expresses not booked to call at Beattock in order to take assistance to the summit: Beattock station,  $39\frac{3}{4}$  miles, is passed in 44 minutes from Carlisle, Summit,  $49\frac{3}{4}$  miles, in 60 minutes, and Carstairs,  $73\frac{1}{2}$  miles, is reached in 84 minutes this average of 52.5 miles per hour including the whole unaided climb. The Glasgow mails are detached at Carstairs, and the north portion then makes the intricate run of  $44\frac{1}{4}$  miles to Stirling in 49 minutes—average 54.2 miles per hour. At Stirling a passenger portion is attached, which has left Glasgow (Central) at 4.20 a.m., and a remarkable run is booked thence to Perth, 33 miles, in 38 minutes, this smart average of 52 miles per hour, including the long climb to Crieff Junction summit. From Perth this is the only non-stop



train scheduled to Aberdeen, the 90 miles occupying 97 minutes, at the high average speed of 55.7 miles per hour. Forfar,  $32\frac{1}{2}$  miles, is passed in 33 minutes, Dubton Junction,  $50\frac{3}{4}$  miles, in 52 minutes, Stonehaven,  $73\frac{3}{4}$  miles, in 78 minutes, and Ferryhill Junction,  $89\frac{1}{4}$  miles, in 94 minutes. This is the fastest train from Carlisle to Aberdeen, occupying only 4 hours 41 minutes for the 240 $\frac{3}{4}$  miles, with three stops, and is also the fastest train from London, with a total time of 11 hours 5 minutes. A corresponding up train leaves Aberdeen at 3.40 p.m., also conveying passengers as far as Stirling, of which the most remarkable run made is from Forfar to Perth in 34 minutes, average 56.5 miles per hour.

After uniting with the Glasgow portion at Carstairs, another very fine run is made to Carlisle, the  $73\frac{1}{2}$  miles over Beattock summit occupying 81 minutes only, an average speed of 54.4 miles per hour. In order that rigid punctuality may be kept, both these trains are limited in weight to a certain fixed maximum number of vehicles.

Of all the Caledonian express train services, those that are best known, and will doubtless excite the most interest, are the West Coast Joint expresses running to and from London. Of these the most remarkable is still the famous 8 p.m. tourist express ex Euston, which is booked from Carlisle to Perth, 150 $\frac{3}{4}$  miles, in 186 minutes, including a 2-minute stop at Beattock to take water and attach a bank engine, and another conditional stop of the same duration at Stirling if required to set down passengers. During the summer season the time is reduced to 3 hours, while two relieving expresses, the 7.55 p.m. from Euston for Inverness, and an express from Liverpool and Manchester to the Highlands, are also booked to make the same journey in a fraction over the same time. The whole distance is shown non-stop in the public books, but the actual non-stop run is usually from Beattock to Perth, 111 miles. The start-to-stop run from Carlisle to Beattock, 39 $\frac{3}{4}$  miles, is only allowed 43 minutes during the summer, average 55.5 miles per hour, 10 minutes are booked for ascending the 10-mile bank, and the remaining 101 miles have to be covered in 116 minutes, average 52.3 miles per hour, despite the many junctions, compulsory slacks and switchback grades encountered. I have travelled by the train, however, when the whole 150 $\frac{3}{4}$  miles were covered non-stop, and this, moreover, with no troughs at which to take water; on this occasion with a very heavy load, headed by two "Dunalastairs," Perth was reached in 172 minutes from Carlisle—a through average of 52.6 miles per hour. Stirling was passed in 134 minutes, or only 9 minutes more than the old racing schedule.

On the London-Glasgow service, the fastest daily train is the luxurious 2 p.m. "Afternoon Corridor" from Euston, which runs from Carlisle, leaving at 8.13 p.m., to Glasgow in 2 hours 7 minutes. A call is made at Beattock in 44 minutes from the start for water and to take assistance to the summit when necessary, as the train weighs nearly 300 tons, while a further stop is made at Strawfrank Junction, Carstairs, to detach the Edinburgh portion. On the return journey from Glasgow (Central) at 2 p.m., the 102 $\frac{1}{4}$ -mile run to Carlisle is non-stop throughout, as the Edinburgh and Aberdeen portions are run in advance; 2 $\frac{1}{4}$  hours are allowed. The magnificent 4-6-0 express locomotives which are now standard on the Caledonian Railway were first specially designed to work this service, without pilot assistance, and for many years the pioneers—No. 49 and No. 50 "Sir James Thompson"—used to take turns to work the 2 p.m. express from Glasgow to Carlisle, and to return at 8.13 p.m. with the corresponding train from London. The 11.50 p.m.

night express ex Euston, which throughout the winter is decelerated by  $\frac{1}{4}$  hour, owing to the Glasgow, Edinburgh and Aberdeen portions being combined in one train, in the summer is booked from Carlisle to Glasgow in 2 hours 5 minutes with the usual conditional stop at Beattock. On Sunday mornings in future, however, it will have the same timing, and make some remarkable runs. The  $30\frac{3}{4}$  miles to the conditional Beattock stop will occupy 42 minutes—average 56.8 miles per hour; the  $33\frac{3}{4}$  miles thence over the summit to Carstairs, where the train will be divided, will be covered in 39 minutes—average 51.9 miles per hour; the last 29 miles to Glasgow, which are always taken easily on account of the many service slacks, will be booked 40 minutes: of other down trains the 3.57 p.m. ex Carlisle (first portion of 10 a.m. ex Euston) is scheduled to Symington,  $66\frac{3}{4}$  miles, in 77 minutes, and the 4.7 p.m. ex Carlisle (second portion) in 79 minutes, neither of these trains usually requiring to take assistance up Beattock bank.

On the up journey some remarkably fast times are in force, especially south of Carstairs. The 10 a.m. ex Glasgow (Central) and the 10.5 a.m. ex Edinburgh are united at Strawfrank Junction, and run thence to Carlisle over the summit,  $73\frac{1}{4}$  miles, in 81 minutes—average 54.3 miles per hour, arriving at 12.12 noon. The 10.45 p.m. ex Glasgow and the 10.50 p.m. ex Edinburgh night expresses to London are united in Carstairs station and run to Carlisle in the same 81 minutes over a distance  $\frac{1}{4}$  mile further. The 2 p.m. ex Edinburgh joins the Aberdeen portion at Symington, and covers the  $66\frac{3}{4}$  miles thence to Carlisle in 73 minutes, average 54.9 miles per hour. Each of these trains is booked to cover the  $49\frac{3}{4}$  miles from Beattock summit to Carlisle in 50 or 51 minutes, although speed on the actual incline is strictly limited in view of its winding character. Among other very smart runs the 4.30 p.m. Liverpool and Manchester express ex Glasgow is booked start-to-stop from Beattock to Carlisle in 42 minutes, the  $39\frac{3}{4}$  miles run entailing an average speed of 56.8 miles per hour. Other start-to-stop runs of really remarkable celerity are from Beattock to Lockerbie, 14 miles, in 16 minutes—average 52.5 miles per hour, and from Lockerbie to Carlisle,  $25\frac{3}{4}$  miles, in 28 minutes by two trains, averaging 55.2 miles per hour.

A detailed examination of the working time-books of the Caledonian Railway, for the use of which I am indebted to the courtesy of Mr. T. W. Pettigrew, the General Superintendent, shows that these lightning short-distance "snippets" are a great feature of the "Caley" programme, and they are also to be found in profusion in the Northern district. For instance, over the  $32\frac{1}{2}$  miles start-to-stop from Forfar to Perth, there are one express in 32 minutes, three in 34 minutes, one in 38 minutes and one in 39 minutes, with a conditional and regular stop respectively, and actually an express "fish" train in 39 minutes! The train mentioned with the regular stop runs from Forfar to Coupar Angus,  $16\frac{3}{4}$  miles, in the "flying" time of 18 minutes, averaging 55.8 miles per hour for this very short distance—one of the most remarkable bookings in the kingdom. In the reverse direction there is a train from Perth to Forfar in 35 minutes, and another in 38 minutes; the 8.6 p.m. ex Perth is booked from Coupar Angus to Forfar,  $16\frac{3}{4}$  miles in 19 minutes, and the  $15\frac{1}{2}$  miles from Forfar to Bridge of Dun Junction in the same time, while the night express from Euston also makes the latter run, when required to stop at Bridge of Dun, in 17 minutes. Such really extraordinary bookings, which are well maintained in ordinary working, are amply sufficient to prove the ability of Caledonian Railway to accelerate the long-distance services when it shall become necessary or expedient to do so.

The best-known trains on the Inter-Scottish services are doubtless the famous "Grampian Corridor" expresses from Glasgow and Edinburgh to Perth and Aberdeen. These trains leave Glasgow (Buchanan Street) at 10 a.m., and 5 p.m., occupying from 3 hours 50 minutes to  $4\frac{1}{4}$  hours on the through journey, with a number of intermediate stoppages. Corresponding up trains leave Aberdeen at 10-5 a.m. and 5-30 p.m., covering the distance in the same time. The fastest trains on the Aberdeen service are, however, those in connection with the postal service to and from the South, already mentioned; the 4-20 a.m. from Glasgow (Central) covers the  $160\frac{3}{4}$  miles to Aberdeen in  $3\frac{1}{4}$  hours, with three stops, while the 3-40 p.m. from Aberdeen runs to Buchanan Street in  $3\frac{3}{4}$  hours. Restaurant cars are attached to the 7-40 a.m., 10 a.m., 5 p.m., and 6-10 p.m. trains from Glasgow, and to the 6-45 a.m., 10-5 a.m., and 5-30 p.m. trains from Aberdeen for those portions of the journey necessary in each case for the service of breakfast, luncheon, tea and dinner. "Grampian" non-corridor stock has been running for some time on the Glasgow-Edinburgh direct service, the fast trains of which occupy from 65-75 minutes on the journey, the extremely difficult character of the  $46\frac{1}{4}$  miles traversed precluding a more rapid booking. These magnificent coaches are also used on the services to and from Greenock, Gourrock and the Clyde Coast Resorts, and special stock of this character has also been built for service on the Oban line, the vehicles in this case being shorter, however, on account of the sharpness of the curves passed over *en route*.

These few details will suffice to show how the Caledonian Railway stands in the very forefront of British lines as regards both of the two cardinal essentials to an efficient express passenger train service—comfort and celerity—and it will thus be understood how "Caley" enterprise in the past forms the exact measure of its popularity in the present.



A CALEDONIAN  
RAILWAY  
TAIL LIGHT.

(NOTE—The lamps are  
painted white).





### CALEDONIAN RAILWAY SIGNALS.

IN journeys north of the Tweed one meets with an entirely different breed of semaphore signals. This is exemplified in the photograph, taken at Crieff station, reproduced in Fig. 2 herewith. The spectacle of this, one of the older patterns of Caledonian signals, is a rather heavy looking casting with egg-shaped green and red glasses. The lamp is shown near the bottom of the post, this being the normal day position. When required for night

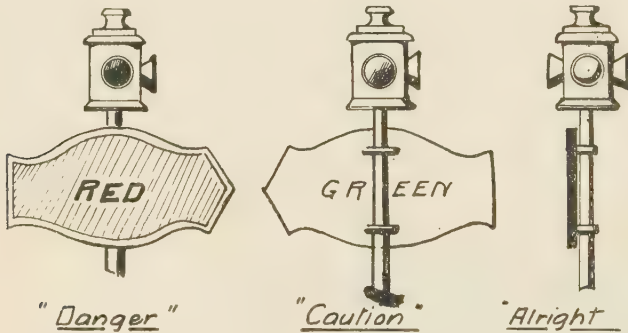


FIG. 1.—OLD-TIME CALEDONIAN RAILWAY SIGNALS.

(Note the three positions.)

service it is lighted and hauled by the windlass and chain to the top of the post. The objection to this arrangement is more or less obvious. The lamp is not firmly fixed and shakes in a high wind. The vertical adjustment of the lamp relatively to the red and green spectacle lights is of course not perfect, and therefore this type of signal has given place on the Caledonian Railway to the new one shown in the accompanying drawing kindly supplied by the company's engineer.

It will be seen on comparison of the two pictures that the lattice-work post is retained, also the standard type of finial. Indeed, the chief points of difference lie in the design of the spectacle and in the fixed position of the lamp adopted in the more modern signal. The balance-weight lever is also still placed fairly high up, and the weight secured by a set screw, and by a chain as an additional safeguard. The pivot plate to which the lever is attached has a quadrant with cast stops to limit the movements of the semaphore. The spectacle is not equally divided, the green portion being considerably deeper than the red. The signal-arm or semaphore on the face



# **CALEDONIAN RAILWAY SIGNALS.**

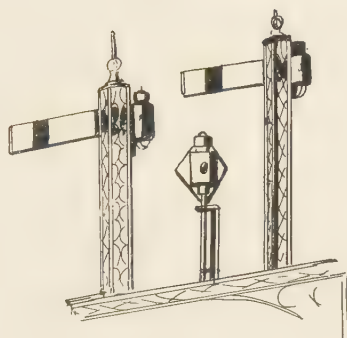


FIG. 4.—A PECULIAR DISC SIGNAL  
FIXED ON A GANTRY.

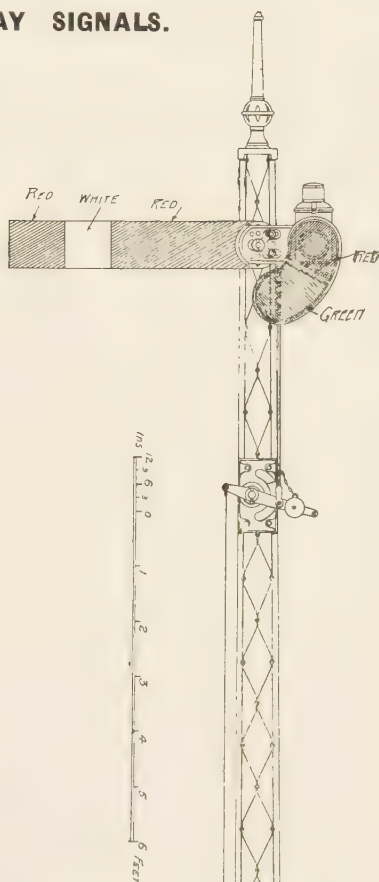


FIG. 3.—  
THE LATEST  
STANDARD  
SEMAPHORE  
SIGNAL AND  
GROUND DISC  
TO SCALE.

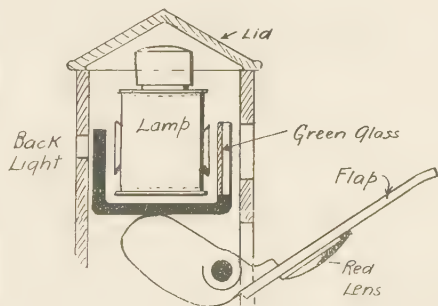


FIG. 6.—SKETCH OF MECHANISM,  
CALEDONIAN GROUND DISC SIGNAL.

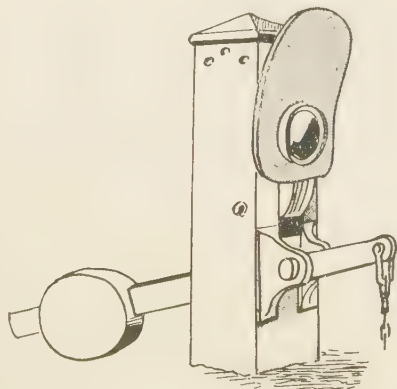


FIG. 5.—A TYPICAL CALEDONIAN  
GROUND DISC SIGNAL.

side is painted the usual red with a substantial white stripe, and at the back it is white with a black stripe. The spectacle casting has an adjustable fixing to the arm, so that the glasses may be correctly centred with the lens of the lamp.

The ground disc used on the Caledonian Railway is also of a type not seen in the South. The post is of cast iron, hollow and square. It holds the lamp, the cap at the top forming a hinged lid necessary to put the lighted lamp in. Ventilation holes are provided in the side walls to allow the products of combustion to escape. The front of the post has a large hole for the main light, and at the back a smaller one, which acts as the back light, is arranged



FIG. 2.—PHOTOGRAPH TAKEN  
AT CRIEFF STATION OF  
OLDER PATTERN SEMAPHORE  
SIGNAL. CALEDONIAN  
RAILWAY.

(NOTE the lamp is in the day  
position near the bottom of the post.)

The day signal consists of a red plate of the shape shown in our perspective sketch, which flaps down to the horizontal position to indicate the allright signal. The red-coloured lens which provides the "danger" signal at night is fitted to this plate near the bottom. The allright signal at night is however a green light, and to give this a rather ingenious mechanism is provided inside the post. This is detailed in the memory sketch reproduced in Fig. 6, and, as will be seen, the heavy counter-weight fitted to the bottom of the flap is so arranged that when it moves into the "line clear" position it lifts a U-shaped slide which in the front has a piece of green glass fitted. The back portion of the U is solid, and in the "off" position therefore cuts off the small white back light.

Purple lights have been tried by the Caledonian Railway for disc signals in place of the green, but they do not appear to have been altogether satisfactory, more especially in bad weather. The writer noticed one or two special disc signals in which the standard design is not followed. At Perth station there is a disc signal perched up on the horizontal member of a

gantry, as sketch in Fig. 4. Here the lamp is fixed to a rotating post, and has in front of it as a day danger signal a diamond-shaped plate painted on the face the usual signal red colour. This diamond is about 8 or 9 inches square. A larger signal of the same kind on the ground, with a diamond plate quite a foot square is also in use at this station. The post is rather tall, the top of the diamond being about 3' 6" from the ground. The lamp is round, and has the usual green lens at right-angles to the red light.

In dealing with the signal engineering work of the "Caley" it would be obviously unfair not to refer to the power installation in use at the Central



FIG. 7.—INSIDE A  
CALEDONIAN RAILWAY  
SIGNAL BOX.

This Cabin is equipped with block instruments for the double line on one side and with Tyers Electric Tablets for the single line working in the other direction.

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Note the wire tension racks on the signal levers.

Station, Glasgow, more especially as this station possesses one of the largest, if not the largest, locking frame in the world.

The whole of this magnificent station is controlled from one signalbox. As it would have been impossible to do this in any other way, the company, on planning the station, decided upon a power system, and after trying several systems, adopted the Westinghouse electro-pneumatic system, and placed the contract with Messrs. McKenzie & Holland, Ltd. (now the McKenzie, Holland & Westinghouse Power Signal Co., Ltd).

The points and signals are actuated by air compressed to about 70 lbs. per sq. inch, the valves of the "motors" being opened and closed electrically

by circuits controlled by the movements of small levers in the "miniature" locking frame in the signalbox.

The signalbox is situated between the old and new Clyde bridges, and is end on to the station. The floor is 107 feet long by 16 feet wide. The locking frame is 83 feet long, and contains no less than 374 levers. One interesting feature of the outdoor appliances is that there is only one arm for each road, although it may be possible to enter these roads from various others. This arrangement lessens the number of arms, and at the same time makes the signalling less confusing. For instance, from No. 5 down line it is practicable to enter No. 13 or No. 12 platform, but there is only one arm. From No. 3 down line it is practicable to run to any platform in the station except Nos. 1, 11, 12, and 13, and yet there is only one arm. The lower calling-on signals, leading as they do to the same roads, have also only one arm. The elimination

FIG. 8.—  
PHOTO OF  
ARDLER  
JUNCTION  
SIGNAL BOX.



of such a large number of signal-arms has greatly simplified the signalling from a running point of view. It has made the signals so that they can be clearly distinguished: they have been placed adjacent to the lines they apply to, and there is no need for a driver to count up the arms to see into which road he is being turned. There is also the economy to the company in having fewer arms and lamps to provide, to say nothing of the reduction in the cost of maintenance and "lighting" of the latter, and this economy has been obtained with all due regard to safety. Although there is only one inner home signal-arm for leaving No. 3 down line for one of nine platforms—access can be obtained to No. 7 platform by either of two routes, so that there are ten ways a train can go from No. 3 down line—there is a separate lever in the locking frame for each route, and ten levers are set apart for this signal and another ten for the lower calling-on arm.

The reduction in the number of arms has been obtained by the use of indicators which bear upon them the number of the platform or road, under the arms, as seen in Fig. 9. This contains number slides, all of which bear numbers corresponding to those of the roads the signal leads to. These are normally kept in the upper part of the case behind where the words "To



Platform" appear, and are held up by an electric lock. In the case is also a shutter which is normally down as seen when the signals are "on." When a signal is to be lowered its lever is pulled: this movement energises an electric lock which releases the corresponding slide, also the motor which lowers the slide into position behind the shutter. The number slide coming into position closes a circuit controlling the motor, which operates the signal-arm and indicator shutter, the arm coming "off," and the shutter being withdrawn from in front of the number. Say, for instance, a train has arrived on No. 5 down line, and is standing at the main home signals, and is waiting to be admitted into No. 13 platform. The signalman would first "set" his road, and then pull over No. 11 lever, which would cause an electric

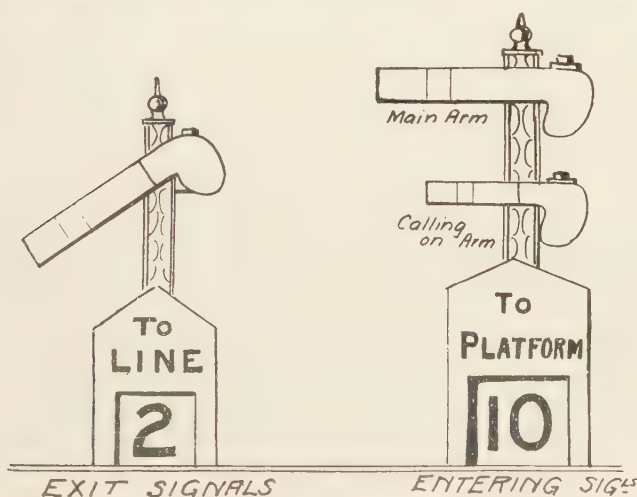


FIG. 9.—ROUGH SKETCH OF ELECTRIC PNEUMATIC SIGNALS,  
GLASGOW CENTRAL STATION.

current to flow to the indicator case and withdraw the lock from the slide bearing the number 13. The current would flow to the magnet of the motor, which would cause the slide to be lowered, and then to the motor that would lower the arm and raise the shutter.

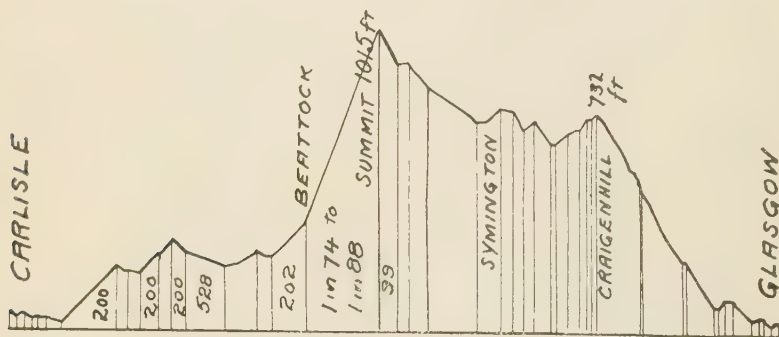
The signals for leaving the station are similarly arranged, except that they are lettered "To Line," and that they are provided with a slide with the letter S for shunting, which has a separate lever in the locking frame. When the lever in the locking frame is restored the exhaust valves of the two motors are opened and the signal rod falls, restoring the arm and lowering the shutter. The larger motor being exhausted causes the number slide to be raised and locked. The indicator cases are well illuminated. The shutter has in it holes, placed in triangular form, through which the light shines when the shutter is down. When it is raised and a number slide falls, the latter is then illuminated.

Last year a 30 horse power petrol road motor charabanc was converted at St. Rollox for running on rails and used to convey passengers across the famous Connel terry bridge.

## THE ENGINEERING FEATURES OF THE CALEDONIAN RAILWAY.

BY CECIL J. ALLEN.

As befits a line engineered through the wilds and fastnesses of rugged Caledonia, the engineering features of the Caledonian Railway are in many respects noteworthy, while, at the same time, in common with practically all the Scotch railways, this line suffers from very severe grading. There is scarcely any portion of Scotland which could be called level: what is not actually mountainous is undulating, and on this account the commanding position occupied by the "Caley" in the matter of speed is all the more remarkable, when the enormous grading difficulties to be contended with



CALEDONIAN RAILWAY GRADIENTS, CARLISLE TO GLASGOW.

are taken into account. The speed achievements are described fully in another article, but we will now run briefly through the gradients of the various main lines, as throwing an interesting sidelight on the speeds of the various express train services.

Leaving Carlisle, a good start is obtained with seven miles of very gradually falling grades almost to Gretna. At this point, however, commences a continuous  $7\frac{1}{2}$ -mile bank at from 1 in 103-200, followed, after a brief 3-mile level track, by a further  $4\frac{1}{4}$  miles up at 1 in 200-203. This point is known as Brackenhill Summit, and is 248 feet above the level at Carlisle. There is then a brief  $1\frac{3}{4}$ -mile drop at 1 in 200, and a further 5 miles down at 1 in 528 past Lockerbie, followed by  $6\frac{1}{4}$  miles of an undulating character. This leads to the foot of the famous and formidable Beattock Bank, very far more severe than Shap incline on the L. & N.W.R., and the steepest gradient of its length on the Caledonian main line. The first  $4\frac{1}{4}$  miles are mostly at 1 in 202, and bring us to Beattock station, where engines are always kept in steam in order to "bank" trains up the incline as required. At this point Beattock Bank proper commences: it has an unbroken length of

exactly 10 miles, the steepest gradient is 1 in 60, and the flattest 1 in 88—certainly not a very enviable range to tackle for a heavy express booked at a high average speed! Beattock summit is 1,015 feet above sea-level, 115 feet higher than Shap, and 947 feet above Carlisle, from which town it is  $49\frac{3}{4}$  miles distant. It is worthy of note, as illustrating the remarkably fine locomotive work scheduled on the Caledonian system, that trains are actually booked out to Beattock from Carlisle in 42 minutes, over a  $39\frac{3}{4}$ -mile road of which a good half is on severe rising grades, while expresses are also booked to the summit— $49\frac{3}{4}$  miles—in the even hour, despite the fact that there is a clear rise of 947 feet on the journey. However, the matter of speeds is amply dealt with elsewhere.

On the farther side of Beattock Summit the conditions of grading are



CONNEL FERRY CANTILEVER BRIDGE, CALEDONIAN RAILWAY.

entirely different. There is a sharp fall at 1 in 99 for  $2\frac{1}{4}$  miles to a point near Elvanfoot, where the river Clyde is crossed for the first time at a point not far distant from its source—here, of course, a wild mountain burn, in keeping with the rugged grandeur of the Lowland scenery. After an almost imperceptible rise for  $1\frac{1}{2}$  miles, the fall recommences, and continues unbroken for 9 miles down the Clyde valley to a third crossing of the river at Lamington. This incline is, however, far more gradual, commencing at 1 in 142-152, but ranging mostly from 1 in 240 to 1 in 330, so that at Lamington we are still at an altitude of 704 feet. From the river there is now a  $2\frac{1}{2}$ -mile rise, partly at 1 in 184, a level  $1\frac{1}{2}$  miles past Symington, followed by  $4\frac{1}{4}$  miles down at 1 in 100-150 (broken by a mile up at 1 in 196) almost to Carstairs, which is even yet very little lower, being 653 feet above sea-level, although  $23\frac{3}{4}$  miles from the summit. Carstairs is the junction for Edinburgh, this branch forming another example of very severe grading. This section of the line commences with a 9-mile rise, mostly at from 1 in 97-225, to Cobbinshaw summit, which is 880 feet above sea-level, and 217 feet above Carstairs. Then follows an absolutely unbroken descent of  $16\frac{1}{2}$  miles, with a clear drop of 667 feet, making a most awkward start for up trains from Edinburgh, which is only 2 miles from the foot of the "bank." Over 6 miles of this bank are at an inclination of 1 in 100, while, beyond  $2\frac{1}{4}$  miles at 1 in 200,

the whole of the remainder is at 1 in 143 or a steeper grade. A 100-mile stretch of line, with a 1,000 feet and an 880 feet summit—as from Carlisle to Edinburgh—would hardly be thought to constitute a “racing” road!

Continuing from Carstairs along the main line, a 5-mile ascent at moderate grades brings us to Craighenhill Summit—732 feet—after which follows the most pronounced down grade on the forward journey from Carlisle to Glasgow and the north. It continues for an unbroken  $11\frac{1}{2}$  miles past Law Junction to Motherwell; 1 in 98 is the steepest inclination, and 1 in 143 the flattest—save for two very brief flatter lengths—and the line during this length falls 488 feet. At Lesmahagow Junction, Motherwell, the main Glasgow (Central) line diverges on the left, and continues to fall for a further  $4\frac{1}{2}$  miles at much



BRIDGE OVER THE DEE AT ABERDEEN.

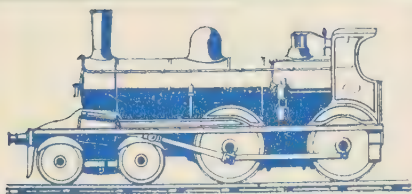
the same grades to Uddingston. From this point there is a rising mile, followed by a level mile and then a final 2-mile fall to Rutherglen, after which the last 3 miles into Glasgow undulate, but are fairly level on the whole. Glasgow (Central) is only  $43\frac{1}{2}$  feet above sea-level. Thus the Carstairs-Glasgow stretch is but little easier than the Carstairs-Edinburgh branch previously described, and up trains by this route get almost as difficult a start out of Glasgow. No gradient on either section, of course, is so severe as the Beattock Bank proper, on the south side of the summit, and piloting or banking is seldom required for South-bound trains, more especially as Glasgow and Edinburgh portions of expresses are each running by themselves over the steeper ascents on the up journey to Carstairs, where they are generally united, whereas Beattock Bank, on the down journey, requires to be tackled by the combined trains.

The north main line, continuing from Motherwell, now commences to undulate, with more or less steep grades, for some distance. The tendency is rising for  $11\frac{1}{2}$  miles to Cumbernauld Summit, 327 feet, but there is a heavy,



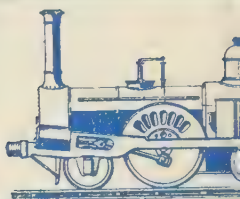


# SOME PAST & PRESENT FAMOUS C

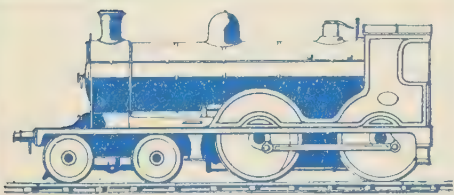


THE OLD "OBAN BOGIES."

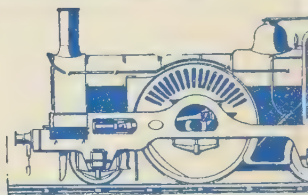
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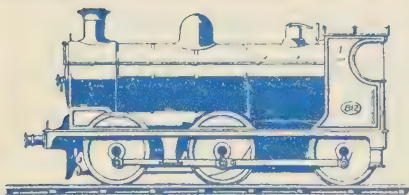
THE FIRST CALEDONIAN



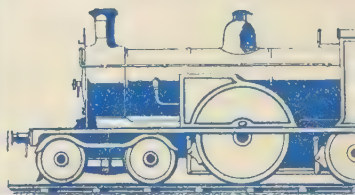
"DUNALASTAIR III."



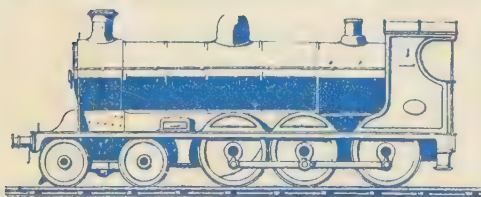
CONNOR'S



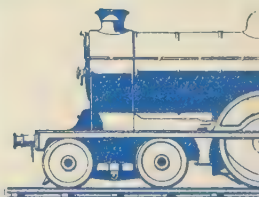
STANDARD GOODS ENGINE.



DRUMMOND'S SINGLE ENGINE



THE NEW "OBAN BOGIES."



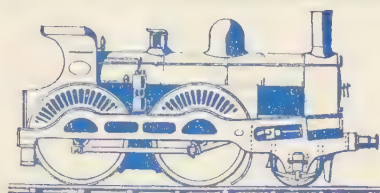
MR. MCINTOSH'S

# EDONIAN RAILWAY LOCOMOTIVES.



N LOCOMOTIVES

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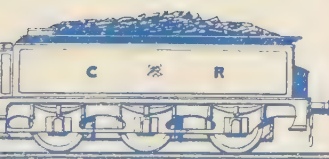
THE "SEVEN FEET."



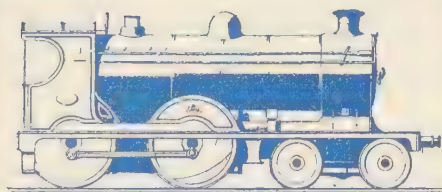
SINGLES.



THE RACING ENGINE, No. 17.



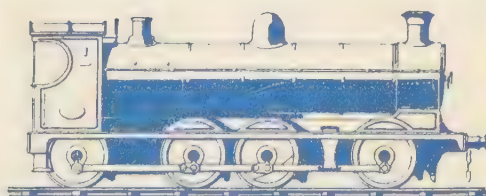
LOCOMOTIVE, No. 123.



THE NEW SUPERHEATER, No. 139.



CARDEAN."



EIGHT-COUPLED MINERAL ENGINE.

*From drawings all to one scale by H. Greenly.*





though broken, fall for a further 11 miles to Alloa Junction, which is only at 57 feet altitude. This "bank" includes 2 miles at 1 in 128,  $1\frac{1}{2}$  miles at 1 in 103, and a mile at 1 in 98.  $1\frac{1}{2}$  miles up at 1 in 126 then bring us to Plean Summit—133 feet—and are followed by 2 miles down at 1 in 118–127. From this point we have a fairly level stretch for 4 miles, during which Stirling is passed, and the river Forth crossed, and concluding at the bridge over the famous "Allan Water"—one of the lowest points on the main line, and only 26 feet above sea-level. The Stirling-Perth length is again very stiff, commencing with a  $5\frac{1}{2}$ -mile incline from this bridge rising 302 feet, mostly at 1 in 88–100, but also including 1 in 74–78. The following 9 miles



GLASGOW CENTRAL BRIDGE OVER THE CLYDE.

also ascend gradually, the summit, just before Crieff Junction, being 422 feet above sea-level. The north side descent is worse than the south side, being  $11\frac{1}{4}$  miles long, of which the initial 7 miles are almost entirely at 1 in 100–121. At the bottom of the bank the river Earn is crossed, at an altitude of only 28 feet, or 394 feet below Crieff Junction, and a level 3 miles thence bring us to Perth.

Henceforward to Bridge of Dun we have the flattest portion of the whole Caledonian system. The first 7 miles out of Perth are rising, with a difference of level of 157 feet, but for the next 35 miles to well beyond Forfar the gradients are almost imperceptible. Forfar is the highest point, being 227 feet above sea-level, and 197 feet above Perth; it is thus no mean achievement to cover the  $32\frac{1}{2}$  miles from Perth to Forfar, with a rise of nearly 200 feet, in 33 minutes, as is done daily during the summer. From Glaisterlaw there is a smart descent for  $3\frac{1}{2}$  miles—at 1 in 96–143—a level 2-mile stretch thence bringing us to Bridge of Dun, the lowest point on the whole main line, being only  $13\frac{1}{2}$  feet above the sea. A somewhat broken rise for 19 miles now succeeds, with three successive "banks," 3 miles, 3 miles and 4 miles in length respectively, culminating at Drumlithie Summit, 355 feet, and with grades

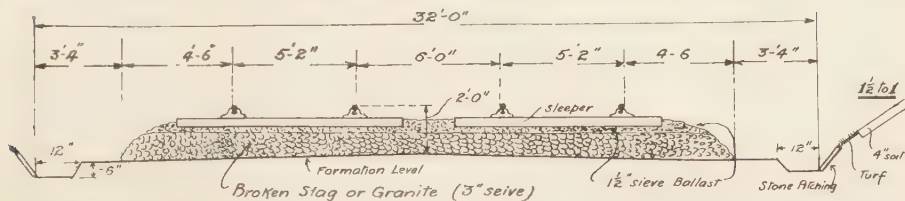
mostly from 1 in 100-200. The final 23 miles to Aberdeen are now very broken, and include the steep 5-mile fall to Stonehaven, and 2-mile rise beyond, averaging 1 in 100 each, and the heavy 7-mile incline into Aberdeen, of which the major portion is steeper than 1 in 200. Little apology is necessary for dealing thus in detail with the gradients of the Caledonian Railway, in order to emphasise the enormous difficulties they place in the way of fast running. There is probably no other British main line so heavily graded throughout its length as this, with its only one level stretch of 30 miles that is worth the mention, and the speeds dealt with in the article on express train services, which should be read in conjunction with the details of grading, are a positive triumph both for "Caley" enterprise and for locomotive design and working.



PLATFORMS NO. 12 AND 13, GLASGOW CENTRAL STATION, CALEDONIAN RAILWAY.

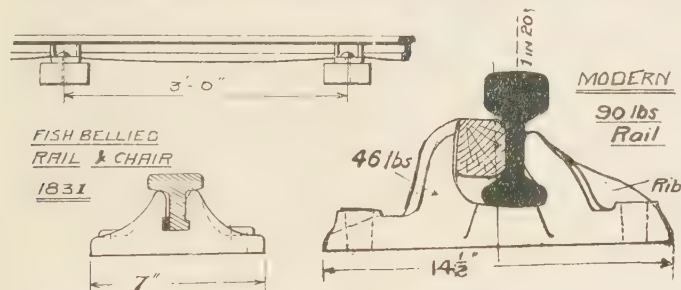
The grading of only one other section requires mention, as it is the most severe on the whole system; it is that of the Dunblane to Callander and Oban line, which cuts right across 80 miles of the wild West Highlands. The gradients are, indeed, so severe that special 4-6-0 locomotives with 5' 0" driving wheels are employed for all traffic. The initial 11 miles to Callander undulate with grades of 1 in 107-200; immediately after this follows the 2½-mile ascent through the Pass of Leny, mostly as steep as 1 in 60. Past Loch Lubnaig to Strathyre there is a level stretch for 7 miles, but this leads to the formidable ascent of Glen Ogle, 6½ miles long, and all but ½ mile at 1 in 60. Glenoglehead is 790 feet above sea-level, 400 feet of which as ascended in this brief rise. The subsequent descent is 5¾ miles long, averaging 1 in 70, but is succeeded by a further level length of 7½ miles along Glen Dochart to Crianlarich. Another steep ascent of 5 miles—mostly from 1 in 72 to 1 in 50—brings us to Tyndrum, after which, following a level mile at the

summit, the line falls for 11½ miles to the side of Loch Awe; the concluding 5 miles are from 1 in 50-100. For 8 miles from Dalmally, skirting Loch Awe, the line is again level; the succeeding 9 miles to Connell Ferry are very sharply undulating, much at 1 in 50-75, while the final length consists of a 3½-mile ascent to Glencruitten Summit, at 1 in 50-70, mostly at the former figure, followed by an unbroken descent for 2½ miles at 1 in 50 into Oban.



CROSS-SECTION OF RAILWAY IN CUTTING.

Special regulations are, of course, in force as regards the working of all these steep inclines, the descents in all cases being made at very moderate speeds. Other running difficulties are emphasised by the unusual notice in the working time-tables : " Drivers of all Trains and Engines must run at such a speed as will enable them to stop at once, if necessary, when passing the Craig at Loch Lubnaig and in descending the Incline in Glenogle. They must occupy



CALEDONIAN  
RAILS AND  
CHAIRS,  
PAST AND  
PRESENT.

not less than 9 minutes in running the distance between the 52 and 55 Mile-Posts on Loch-Awe side during the day, and 15 minutes during the night, as stones are liable to become detached." At the latter point the railway runs close to the lake in the Pass of Brander, at the foot of the steep mountain side, and special wire fences are employed to automatically send the signals to danger in case of land-slips. So much, therefore, for the grading.

We now come to the permanent way—the good condition of which contributes as much to the travelling comfort of the passenger as a level road does to the reduction of the railway company's working expenses. It is a far cry from the old malleable iron fish-bellied T-rail and 8 lb. cast-iron chair used on the Glasgow and Garnkirk Railway of 1831 to the modern standard track, on which are employed steel rails, weighing 90 lbs. to the yard, resting on cast-iron chairs of 46 lbs. weight each. The standard rail-length used to be 32' 0", but these rails are now being replaced, when relaying, with new rails 48' 0" long. The chairs are secured to the sleepers by four  $\frac{7}{8}$ " spikes, instead of the more usual two spikes and two wooden trenails. The sleepers have the customary dimension of 9' 0" by 10" by 5", and are of Baltic redwood or Scotch fir, creosoted, spaced 2' 8 $\frac{1}{2}$ " apart. The







girder structures, somewhat of the same character as the new bridge carrying the Caledonian Railway over the Clyde at Glasgow, illustrated herewith. There are several features of special note in connection with the latter bridge. It is 110 feet wide, carrying nine lines of rails, which, with the old bridge carrying four roads, constitutes probably the largest under-line river bridge in the world. There are, in all, five spans, three over the river of 178 feet, 200 feet, and 160 feet respectively, and an additional two over the adjacent streets. The two river piers are of handsome granite stonework, built on



EXTERIOR OF WEMYSS BAY STATION, CALEDONIAN RAILWAY.

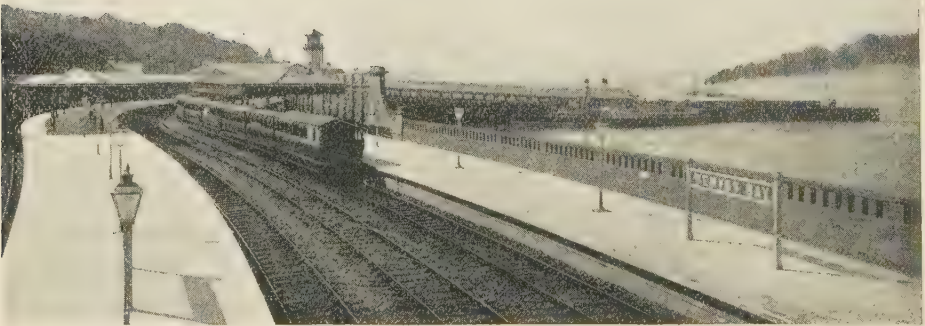
steel caissons, sunk to 50 feet and 66 feet respectively below high water level. The main longitudinal girders are spaced at approximately 12 feet centres, and Hobson's flooring is laid across their upper flanges, presenting a flat top surface for the laying of permanent way. This bridge is a remarkably fine example of modern engineering, and its extremely artistic appearance will be noted in the attached reproduction. Another graceful bridge is that spanning the Dee at Aberdeen, which is built on the curve, and, as seen in the annexed photograph, consists of a series of steel arches. A number of other noteworthy viaducts, which we have only space to mention, are to be found in the hilly districts surrounding the basin of the Clyde; they are formed in almost all cases of a lattice steel superstructure with granite piers, and include the Broomhill Viaduct at Larkhall, the Avon Viaduct, Stonehouse, the Craignethan Viaduct, Lesmahagow, and the Camp and Braidhurst Viaducts near Motherwell. The only tunnels worth mention are those between Greenock and Gourock, 2,100 yards long, and the Moncrieff tunnel, Perth, which is 1,214 yards in length.

In the matter of stations, also, the Caledonian Railway is well to the fore at the present day. The finest station is, of course, the recently enlarged Central station at Glasgow, for which it would be hard to find a rival more

commodious or well-arranged. The extent of the increased accommodation will be appreciated when it is stated that, whereas the nine platforms of the old station aggregated 1,530 yards in length, and covered an area of 6,250 sq. yards, the thirteen platforms of the present terminus aggregate 2,910 yards, or nearly  $1\frac{2}{3}$  miles, and cover an area of 14,000 sq. yards, or considerably more than double the original. The circulating area of the station, again, has been increased from 550 to 3,000 sq. yards. The width of the platforms has been increased from 15 feet to a minimum of 23 feet, and, of the four new



CIRCULATING AREA, WEMYSS BAY STATION.



PLATFORMS, WEMYSS BAY STATION, CALEDONIAN RAILWAY.

platforms, the two new main arrival platforms are 700 and 800 feet long respectively, and 20 feet each in width, separated by a 30 feet cab rank, while a special platform, 1,000 feet long and 33 feet wide, has been arranged, as at Victoria, L.B. & S.C.R., to accommodate two trains independently at the same time. The old main departure platforms have also been lengthened to 900 feet. Among other features, the roof of the new station is of interest, being composed of transverse main girders, at 35-foot centres, with horizontal upper flanges and semi-elliptical lower, with semi-circular roof principals and patent glazing. 240 feet were added to the old roof, and the new main

roof is 950 feet long, the junction between the two being noticeable on account of a striking double row of octagonal steel columns, running the whole length of the station, 11 feet apart. So much has been written, and deservedly, of this magnificent terminus, that no further description is necessary.

Another station of which the "Caley" is very proud, as it has been described by those well qualified to judge as the best-arranged station in the country for the class of traffic with which it has to deal, is Wemyss Bay, of which we give several illustrations. This is the Caledonian Clyde-side station, from which the coast steamers depart, and where it is imperative that the transfer of large numbers of passengers from train to steamer shall be as expeditious as possible. As will be seen, there are two wide island platforms, flanked on the outer side by two single roads, and on the inside by two further roads, with an extra road in the centre in order to allow the engines of incoming trains to "run round" them after arrival. Among the most noteworthy features of this station, however, is its architecture, which is throughout of the most striking character. The extremely elegant curve of the glass roof over the spacious circulating area will be specially noticed, as also the pretty half-timbered external elevation of the station buildings, which it is almost difficult to reconcile with the preconceived modern ideas of what a railway station should look like. Other noteworthy stations on the Caledonian Railway are those at Edinburgh (Princes Street), with its commodious interior and handsome hotel facade, Glasgow (Buchanan Street), Stirling, Dundee (West), Motherwell, Greenock and Gourrock, also the joint stations at Carlisle, Perth and Aberdeen.

The signalling of the Caledonian Railway will be found the subject of another article. It will be agreed that the engineering features are throughout of considerable interest, and we are greatly indebted to the courtesy of Mr. W. A. Pater-son, the Engineer of the line, for the kind supply of the photographs, drawings, and many of the particulars here-with reproduced.



### **WATER TOWERS ON THE CALEDONIAN RAILWAY.**

THE accompanying photograph of a water tower near Perth is typical of many others on the C.R. in this district. It is an excellent example for the model railway builder, as the lower portion may be made of wood as in the real thing, and have a metal tank on the top. The design is a welcome change to the round pattern on a column seen on the southern sections of the West Coast Route.



**FAMOUS  
PAST AND PRESENT LOCOMOTIVES  
OF THE  
CALEDONIAN RAILWAY.**

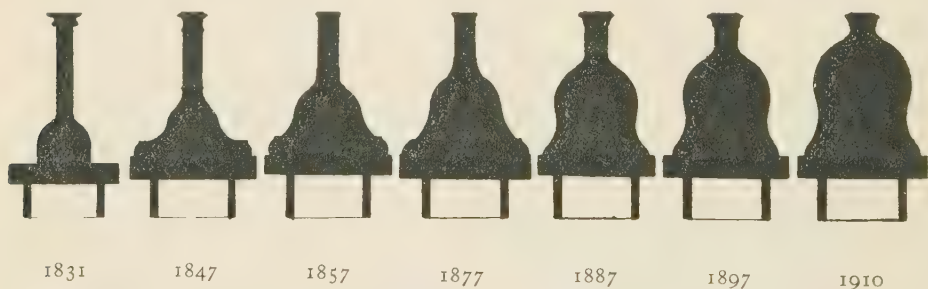


By "Loco."

(See Coloured  
Supplement  
Plate.)



THE modern Caledonian locomotive having already been the subject of an article in these pages, the notes we now submit are intended to give some idea of the evolution of the magnificent machines which are used to haul the Caledonian express trains of to-day. Our supplement plate depicts in outline—all to the same scale—the most famous engines of the Caledonian Railway since the opening in 1847.



1831

1847

1857

1877

1887

1897

1910

A STRIKING DIAGRAM SHOWING THE DEVELOPMENT OF THE CALEDONIAN  
RAILWAY LOCOMOTIVE.

The earlier Stephenson engines of 1831 which were used on the Glasgow and Garnkirk Railway, which line now forms part of the C.R. system, are illustrated in the pictures above. These engines were built by R. Stephenson & Co., and had cylinders 11"  $\times$  16", and coupled wheels 4' 0" diameter. The weight was 8 tons, and the heating surface 320 sq. feet.

*The first locomotive of the Caledonian Railway, 1848.*

The first locomotives of the newly-incorporated company were built in 1847, and were built under the superintendency of Mr. R. Sinclair by the Vulcan Foundry Co. of Warrington. They were typical of the best practice of the day, and, as will be seen by the plate, were very much like Mr. Allan's "Crewe" engines which worked the Northern division of the L.N.W.R. The noteworthy feature of these engines is that the wheel, frame, and cylinder



arrangements—are still to be seen in engines working on the Caledonian to this day.

*Mr. Benj. Connor's 8-ft. Singles, 1859–1862.*

With reference to “8-footers,” which were the pride of the Caledonian Railway from 1859 to the 'eighties, we cannot do better than quote what Mr. A. R. Bennett says about them in his most interesting book *Historic Locomotives*. He writes: “In the International Exhibition of 1862 one of the most admired locomotives was an engine designed by Mr. Connor, the locomotive engineer to the Caledonian Railway, and built by Messrs. Neilson & Co., of Glasgow. Its speciality was a driving wheel 8' 0" in diameter—8' 2" when the tyres were new—a size which had been attempted only twice or thrice on the narrow gauge, and then not very successfully.

Mr. Connor's engine had  $17\frac{1}{4} \times 24$ " cylinders, a heating surface of 1,172 sq. feet, and weighed 31 tons 18½ cwt. in working order. Its appearance had been heralded by rumours of prowess shown at its trials. Ismail, Viceroy of Egypt—a great railway man—saw, admired, and, as was his wont when he came across anything he fancied, purchased. After the exhibition, the engine, which the builders had not yet handed over to the C.Rly., instead of spending its life amongst the Macgregors, sailed for the land of the Pharaohs. But alas! ‘Davy Jones’ either had occasion for a seventy-mile-an-hour locomotive in connection with *his* line or nourished a grudge against Ismail, for ship and loco were lost at sea.”

Another engine was supplied to the viceroy, and we saw a photograph of this particular locomotive taken as recently as 1895, so evidently the type worked quite successfully in Egypt, as it did on the Caledonian, as further engines of the same design were supplied.

Between 1862 and 1864 twelve duplicate engines were built at St. Rollox works. Nos. 78 and 83 were among these, and were the engines which took part in the disastrous accident at Lockerbie on Whit-Monday of 1883. The engines as rebuilt had 2,016 gallon tenders, and weighed in working order a total of 66¾ tons.

*Mr. B. Connor's 7-ft. Four-coupled Locos.*

The “seven-foots” as the four-coupled engines designed by Mr. Benjamin Connor are called, are handsome engines with outside cylinders. They were the outcome of smaller engines of the same general type built in 1869, and are very typical of the decade in which they were built. As will be seen by the supplement plate, they have “open-work” splashers and ornate outer frame-plates. As originally built in 1872 to 1874 by the well-known firms of Messrs. Neilson & Co. and Messrs. Dubs, they had cylinders  $17\frac{1}{2} \times 24$ " stroke, but with the new boilers carrying 150 lbs. instead of 130 lbs. pressure, they have cylinders only 17 bore. The diameter of leading wheels is 3' 8" and the drivers 7' 0". The wheelbase of the engine is 15' 8½", and the total weight with the 1,800 gallon six-wheeled tenders 63 tons as originally designed, and 64½ tons as rebuilt. Messrs. Neilson & Co. in 1877 built a similar class of engine for the Caledonian with a leading bogie.

*The old “Oban Bogies.”*

The “Oban bogies” were designed by Mr. G. Brittan, who was locomotive engineer of the Caledonian from 1876 to the appointment of Mr. Dugald Drummond in 1882, for both goods and passenger service on the Callander

and Oban road. They were powerful engines for their day, as the following dimensions will show :—

|                                            |                                                   |
|--------------------------------------------|---------------------------------------------------|
| Cylinders, 18" dia. $\times$ 24" stroke.   | Heating surface—                                  |
| Driving wheels, 5' 4" diam. with new tyres | Tubes .. 975 sq. feet                             |
| Wheelbase of engine 21 feet.               | Firebox .. III „                                  |
| Wheelbase of engine and tender, 39' 5½"    | Total .. 1086 „                                   |
| Boiler—Barrel, 4' 3" diam., 10' long.      | Grate area, 17 sq. feet                           |
| Firebox, 5' 5" $\times$ 4' 0".             | Working pressure, 150 lbs.                        |
| Tubes. 206 (diam. 1¼").                    | Total weight of engine and tender 65 tons 10 cwt. |

These locomotives were provided with a small four-wheeled tender carrying 1,550 gallons of water. Some of them were rebuilt in 1901 with new boilers, having chimneys of the modern standard type and small Ramsbottom safety valves the same as fitted to the first "Dunalastair."

#### *Mr. Drummond's Single, No. 123.*

This engine was very popular on the Caledonian, and during the latter part of its career has been used for running the officers' specials. It had cylinders 18"  $\times$  26" and driving wheels 7' 6" diameter. The heating surface totalled 1,054 sq. feet and the grate area 17¼ sq. feet. It was provided with a 3,100 gallon tender which weighed 35 tons 8 cwt. The weight of the engine amounted to 41 tons 7 cwt. It was one of the most handsome engines of its day. It was built for the 1888 Race to Scotland.

#### *The Racing Engine, No. 17.*

This four-coupled express locomotive is one of a type introduced by Mr. Dugald Drummond and perpetuated by his successors Mr. Hugh Smellie and Mr. John Lambie. It became famous during the 1895 Race. During the summers of 1908 and 1909 this engine was kept for the "Upper Ward Express," a train which is booked to run non-stop between Thankerton and Glasgow, either way. It has done some extraordinarily good work, and is one of a class of locomotives which may be termed small compared to the more modern engines. These engines were at one time hardly ever seen south of Perth, but now they are scattered all over the C.R. system. The dimensions are as follows :—

|                                      |                                  |
|--------------------------------------|----------------------------------|
| Cylinders, 18" $\times$ 26" stroke.  | Grate area, 19.5 sq. feet.       |
| Driving wheels, 6' 6" diam.          | Weight of engine, 45 tons 5 cwt. |
| Total heating surface, 1,184 sq. ft. | „ 3,560 gall. tender, 39 tons.   |

#### *Mr. J. F. McIntosh's "Dunalastairs."*

This engine was the first of Mr. McIntosh's express locos and bears a name which has made the Caledonian Railway famous throughout the world. The cylinders were 18¼"  $\times$  26", heating surface 1,403 sq. feet, and grate area 20.63 sq. feet. The success of these engines inaugurated the large boiler locomotives. Previously the tendency of locomotive engineers in this country seemed to have been to attempt to get power and speed by large driving wheels, big cylinders, and early cut-offs. The futility of this was conclusively proven when Mr. McIntosh produced the large "Dunalastairs." The "Dunalastair III." class, as the engines of the No. 902 type are called,

with their 4' 9½" boilers and 1,600 sq. feet of heating surface, practically settled the question, and no doubt is now expressed about the wisdom of providing a powerful boiler where a powerful engine is required. The advent of the 140's with still larger boilers was the last word. The "Dunalastair 2nd" (No. 766) was the first engine with a bogie tender on the Caledonian.

### *The Super-heater Engine, No. 139.*

The super-heater engine No. 139 which appeared this year is remarkable as the first Scottish locomotive which has been fitted with this device. It has 20" cylinders against the 19"×26" of the No. 140 class, and with the 330 sq. feet of heating surface provided by the Schmidt super-heater the total is 1,695 sq. feet, or 80 sq. feet more than No. 140. Externally the other differences comprise the separate springing of the axleboxes of the tender bogies, the slight forward extension of the smokebox, and the steam cylinder for the super-heater damper on the side of the smokebox. The cylinders are fitted with piston-valves worked through a rocking shaft, and the engine has mechanical lubricators. The pressure is only 165 lbs. instead of 180 lbs. in the previous engines. The total weight is 115 tons in working order, the tender holding 4,600 gallons of water and 4½ tons of coal. Wonderful results have been obtained with the engine in economy of coal and water. It has been said that there is no other "Caley" engine which will get to Carlisle with 17 inches of water left in the tender, which is the practical man's way of saying that there is about 20 per cent. saving in the water consumption.

### *The new Oban Bogies.*

This class of locomotive was introduced by Mr. M'Intosh for the arduous Callander-Oban route. The wheels are six-coupled, and are only 5' 0" diameter. The tender is small, having only 11' 0" wheelbase and carrying 3,000 gallons of water. This is as much at this particular route requires. The coupled wheelbase is 11' 3", the cylinders are 19"×26", and the total heating surface 1,905 sq. feet. Some slightly larger engines of the same type have also been built for goods and mixed traffic with 5' 0" and 5' 9" wheels respectively.

### *C.R. Goods and Mineral Engines.*

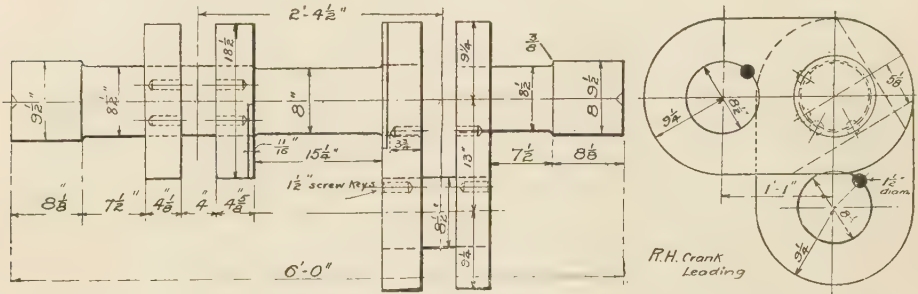
The two drawings in our plate show the engines used respectively for ordinary goods work and for the mineral traffic. The 18½"×26" cylinder, 5' 0" six-coupled engines have a total heating surface of 1,403 sq. feet, and, with a 3,000 gallon six-wheeled tender, weigh 83½ tons in working order. The mineral engines are remarkable for the spacing of the eight coupled wheels. The cylinders are 21"×26" and the driving wheels 4' 6" diameter. The heating surface is 2,018 sq. feet, grate area 23 sq. feet and the total weight with 3,570 gallon tender, 97¼ tons.

### *The "Cardean" Class.*

Of the "Cardean" class much has been written, and therefore we need say nothing further than that they represent the highest development of the Caledonian locomotive. The heating surface is 2,360 sq. feet, cylinders 20"×26", grate area 26 sq. feet, and weight in working order 130 tons. The "Cardean" when we last saw it was fitted with a large "chime" whistle.

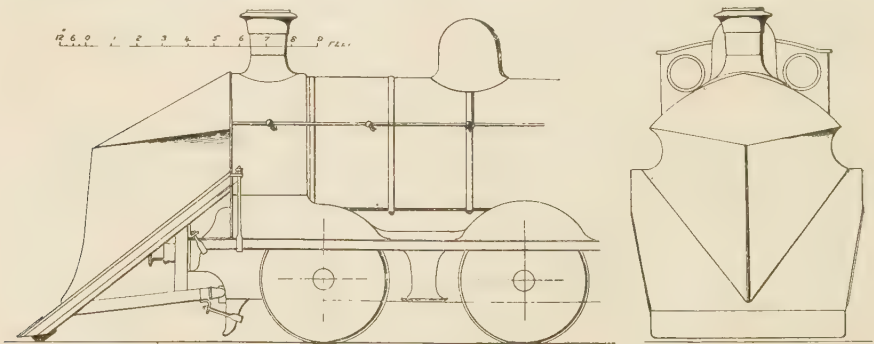
C.R. LOCOMOTIVE CONSTRUCTION NOTES.

WHILE in Glasgow, by the courtesy of the locomotive deparmtent we were shown over the St. Rollox Works. Among the many items of interest, the making of a loco crank-shaft stands out as representative of the up-to-date methods adopted by the Caledonian Railway.



BUILT UP CRANK-SHAFT, AS FITTED TO THE " 900 " CLASS EXPRESS LOCOMOTIVES, CALEDONIAN RAILWAY.

THE standard crankshaft of the Caledonian Railway is now a " built-up " one, as shown in the accompanying working drawing. The webs are made from slabs of steel, and are shrunk on to the crank-pins and axle. They are further secured by 1 1/2" pins, which are screwed with a fine thread (8 per inch) into holes drilled and tapped half in the web and half in the axle, or crank-pin, as the case may be. The holes are 3 3/4" deep, and the screwed pins are let in to 1/16" below the surface of the web. The material of the web is then hammered over the pin. The crank axle shown in the drawing is representative of those fitted to the 18 1/2" goods engines and the Nos. 766 and 900 class express engines.



DETACHABLE SNOW-PLOUGH, AS FITTED TO C.R. GOODS ENGINE.

Besides being a land o' cakes, Scotland in winter time is a land of snow, and a snow-plough is essentially a part of the emergency appliances of every district. The Caledonian empty a detachable one, as shown in the accompanying drawing—which sketch is more or less self-explanatory.



## CALEDONIAN RAILWAY WAGONS.

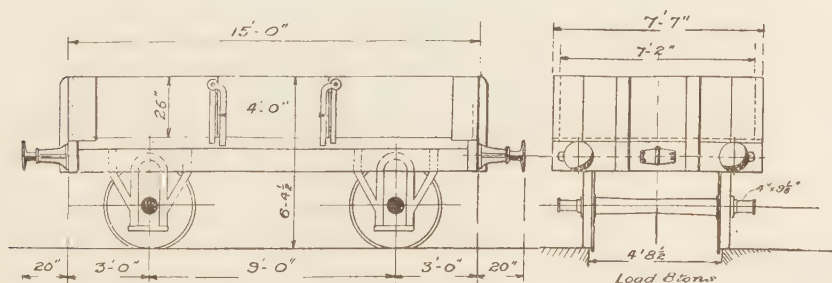
TRAVELLERS on the Caledonian Railway may have noticed the large number of wagons of ancient design which are at the present moment resting in the various lie-by sidings of the system. The wagons were at one time the



SMALL 7-TON WAGONS, CALEDONIAN RAILWAY, NOW OBSOLETE.

*(Note the outside axleguards).*

standard open goods vehicles of the company, but owing to their small capacity, short wheelbase and dumb buffers, are now quite obsolete. Space



MODERN 8-TON LOW-SIDED C.R. WAGON.

will not permit us in this issue dealing in full detail with the modern wagon stock of this company, but for the sake of comparison we reproduce a drawing, giving the leading dimensions of an up-to-date low-sided wagon of 8 tons capacity.

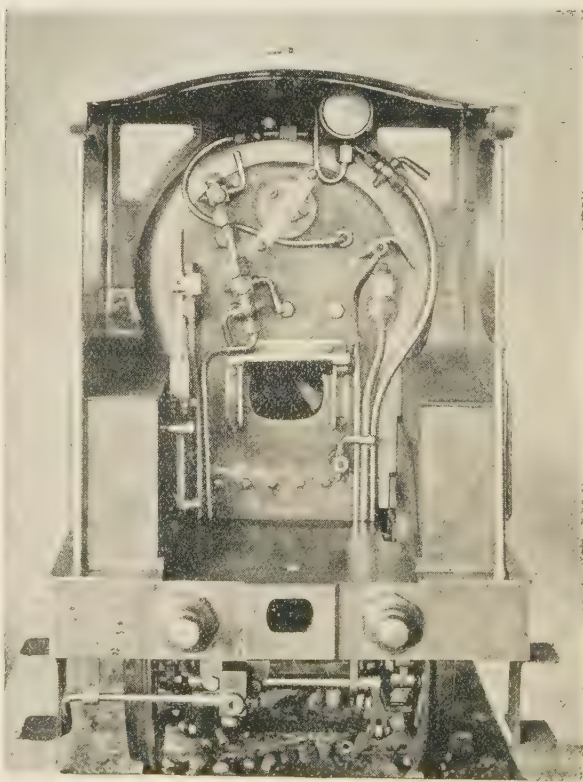
*(To be continued.)*

**A FINE  $\frac{3}{4}$ " SCALE MODEL No. 140 CLASS CALEDONIAN  
EXPRESS LOCOMOTIVE.**



MR. W. H. DEARDEN'S MODEL CALEDONIAN RAILWAY EXPRESS  
LOCOMOTIVE No. 140.

SOON after the appearance of the "third Dunala-stair" class locomotive, Mr. W. H. Dearden, whose model work has gained many distinctions at industrial and other exhibitions, commenced the  $\frac{3}{4}$ " scale  $3\frac{1}{2}$ " gauge locomotive illustrated in the accompanying photographs, and for nearly ten years what spare time he could afford has been spent in making it a perfect working model. The advent of the enlarged "Dunala-stairs" (as the later engines of the No. 140 class are sometimes called) before he had commenced the boiler and superstructures, has allowed him to alter the model to agree with the improved engines, and this therefore accounts for the difference in detail from the original No. 900 class shown in the photographs.



CAB VIEW OF MODEL.

The model is essentially a working model, and its internal design is such as to ensure this, although the main features of the original are followed as much as possible, both inside and out. The engine has cylinders  $1\frac{3}{8}$ " bore and  $1\frac{1}{8}$ " stroke, with valves between operated by Stephenson's link motion. The boiler is of copper, and fitted with ten  $\frac{1}{2}$ " flue tubes and a direct stayed firebox. The firebox has eight water-tubes which connect the side water spaces with the crown and ensure a perfect circulation. The crank is turned out of one piece of steel, complete with eccentrics, eleven lathe centreings being required for this operation. The engine is fitted with steam brakes and the tender with fully-rigged hand brakes. The tender is mounted on bogies in accordance with the prototype, and carries a supply of water and a space for paraffin fuel.

The boiler is designed to burn either coal or paraffin by a "Primus" burner, and has a steam blower and all the usual fittings. The model is further embellished by a miniature replica of the Westinghouse brake pump. The boiler is fed by a hand pump situated in the tender tanks.

Extreme care has been taken with every part, and the clean-looking job obtained deserves great credit, and excellently reproduces the neat outline of the Caledonian prototype. The model only requires painting to complete it.



DURING our recent visit to Scotland we heard that there was a model of the second "Dunalastair" class in the Perth locomotive workshops. Enquiring of Mr. Cowen, the district superintendent, he instituted a search for it, which



MODEL "DUNALASTAIR II." AT PERTH LOCO WORKS.

resulted in the storekeeper producing from a well-sealed box the  $\frac{1}{2}$ " scale model shown in the accompanying photograph. The model was made some years ago by the coppersmith at Perth loco shops, and is an excellent replica of the original, in every external detail.



CALEDONIAN PLATELAYERS' HUTS.—Most platelayers' huts on the Caledonian are in contradistinction to the practice "down south," whitewashed all over. Model railway builders will brighten up their railways by copying this practice.

## NOTES ON POWER FOR MODEL ELECTRIC RAILWAYS.

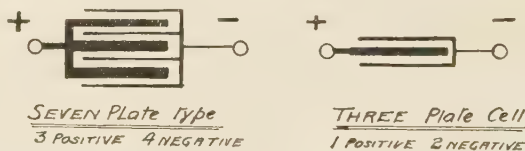
BY GEO. D. DUNKERLEY, B.Sc.

(Continued from page 355.)

THE efficiency of accumulators depends largely upon the care and attention given to them. In the hands of a systematic and scientific worker they are invaluable, but too often they are neglected to such an extent that very soon a new outfit is required. Complaints are often made, but in the majority of cases it is the treatment that is at fault, and not the accumulator.

If a good set of accumulators by a well-known maker is obtained, then with ordinary care and strict regard to certain well-defined rules, a convenient regular and reliable source of power is available. A short non-technical talk on the theory and care of accumulators would probably be of value to amateurs who are thinking of using a set.

Each accumulator contains at least one positive and one negative plate. In order to reduce the resistance of the cell to the passage of current, and also to increase the capacity, a number of plates are generally used, the plates being connected to terminals labelled + and —. The arrangement usually adopted is shown in the diagram :



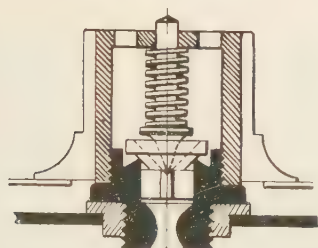
The plates are made of lead mainly, and are stamped with holes or grooves (according to the make), which are filled with a specially-prepared paste of one of the oxides of lead mixed with pure sulphuric acid. The negative plate or grid is filled with litharge or yellow oxide of lead paste; the positives contain red lead paste. After filling—this being done under pressure—the plates are allowed to dry and harden in the air. They are then lead soldered to terminals, according to the type required. The sets are placed in dilute sulphuric acid of density 1.19, and are rendered active by passing a current through them from the positive to the negative. This causes the positive plate to become brown, and the negative grey in appearance, owing to the formation of brown peroxide of lead and spongy lead respectively. In passing the current through the cell in this way a chemical action has been brought about at the expense of the electricity, and new materials have been produced on the plates. These materials in contact with the acid change back into their original forms if the terminals are connected, and in changing back they reproduce the electricity, which flows from the positive terminal to the negative outside the cell. Really electrical energy is converted into chemical energy in charging the cell, and on discharging, chemical action takes place in the opposite way and electrical energy is reproduced.



To get the cells in good condition for work, they are slowly charged and discharged several times. The cells, after being "formed" in this way, are emptied of acid, air-dried, and sent on the market, with full directions as to charging and discharging. These should be obeyed strictly, otherwise good results cannot be expected.

The electricity required to charge an accumultaor will depend on the amount of active material present, that is, on the number of plates and the thickness of the paste. Speaking generally, a current of one ampere per 14 square inches of positive plate (reckoning both sides) would be used for ordinary charging. For a first charge a current of half this strength is found better. In either case the charging is continued until the acid has turned milky and gas is freely evolved from both plates, and the density of the acid has risen to 1.205. The initial charging will take 20 to 40 hours, after which the time taken will depend on how often the cell is placed on charge.

*(To be continued.)*



"POP" VALVE. FULL SIZE FOR  
3 $\frac{1}{4}$ " GAUGE MODEL.

### MR. HENRY GREENLY'S MODEL "POP" SAFETY VALVE.

The new safety valve designed by the writer, which is being manufactured by Messrs. Butcher & Co., of Franklin Road Works, Watford, Herts., is an attempt to provide in model sizes a proper "pop" action valve which has none of the complications of those employed on real locomotives. The new valve has no more parts than any other valve.

We understand that every valve is to go out tested under steam, and stamped with the pressure at which it works. The action of the valve depends on a secondary and larger area for the steam pressure to act upon when once the working pressure is exceeded. The valve, therefore, when it blows, lifts an appreciable distance, which is plainly visible. The steam is thereby allowed to escape rapidly, and the valve then shuts down with a predetermined reduction of pressure in the boiler (from 2 $\frac{1}{2}$  to 5 lbs. on a 50 lb. safety valve).

The secondary area is a species of piston which is integral with the valve proper. This piston is a loose fit in the cylindrical recess above the valve seating, so forming an annular space of a definite area. The conducting orifice at the bottom of the valve body is so shaped to prevent priming during the sudden release of steam. These factors govern the amount of pressure lost, and in a small valve, such as would be used on a  $\frac{1}{2}$ " scale locomotive, micrometer dimensions are necessary. The important point with regard to the design is that it involves no intricate mechanism. There is nothing to get out of order.

The writer was able, during his visit to Mr. Mitchell's railway at Sheffield, to try this valve on the tank engine illustrated in last issue. It worked all day under service conditions without the slightest trouble, and on no occasion allowed the pressure to accumulate a pound beyond the proper maximum boiler pressure. Even in the smallest steam boiler there is an element of danger, and it behoves the user to see that he has a safe safety valve.

# Letters to The Editor



C.J.A. 05

## ALTERING MODEL CALEDONIAN RAILWAY COACH.

TO THE EDITOR *Model Railways and Locomotives*,

DEAR SIR,

In reply to your request for particulars as to how I converted the official model Caledonian carriage (the 1/6 one obtained from the company) to run on rails. I first cut off the bogie frames which were on the car as obtained, and then drilled a hole in the floor of the coach and fixed the bogie on. Only two things must be remembered—(1) That *only* the 1/- bogies will do, because of the narrow frames; (2) That they must be put as near to the buffer-beam as possible, because the car is so long, that if they are not right at the end the buffers will lock when used with other cars. I altered the coupling, and put the standard tin-plate coupling, but in order that the floor of the coach should be more



PHOTOGRAPH OF OFFICIAL MODEL CALEDONIAN RAILWAY COACH, AS ALTERED TO RUN ON RAILS, BY MR. G. HERBERT KING.

secure and not come out, I bent inwards a little piece of the door at the end. You will see that there are two niches for the coupling to go through; well, the space between I bent inwards and so stopped the floor giving way. You will find that the car wants weighting, so put lead where the gasometers are; don't cut them off, but put it in between and fasten it to the advertisement on the floor underneath. The thing which made the coach look a lot better was the addition of some hobnails as ventilators, which were soldered in from the inside of the roof at the places marked. It will then go round the standard large radii curves. Don't take too much of the coach to pieces, otherwise there may be difficulties in putting it together again.

I am, yours faithfully,

G. HERBERT KING.

## EXPRESS LOCOMOTIVES OF L.B. & S.C.R.

TO THE EDITOR *Model Railways and Locomotives*.

DEAR SIR,

I beg to submit a few notes in reference to the article on the above, which, although not very important, may prevent your readers from perpetuating mistakes. Firstly, two "Atlantics," Nos. 39 and 41, have 19" cylinders; secondly, the large bogie expresses as illustrated in November have not had boilers with less heating surface—this only applies to the small bogie expresses, including the "Bessemer," No. 213, so that the line should read "the working pressure is also increased to 170 lbs." Thirdly, these same boilers, 5' 0" diameter, have been put in five of the "Vulcan" goods only, and in no other type of loco. The boilers put in the 0-4-4 and 0-6-2 are 4' 6" diameter, with extended smoke-boxes exactly similar to the 11-20 4-4-2 tanks. Several of the "Siemens" type have had new boilers, but they are the same as the original ones. I should be glad to give you any further information if possible.

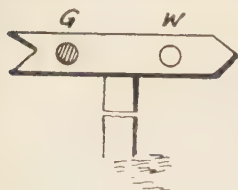
Yours faithfully,

H. F. HAMER.

ADDISCOMBE.

## ANSWERS TO CORRESPONDENTS.

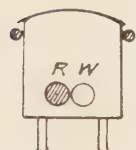
E. RICHARDSON (Perth, N.B.) writes: Dear Sir,—I must apologise for once more using your journal to satisfy my curiosity, but I would like to know, if you can tell me, what the name and duties of the original of the enclosed sketch are. A reply through the medium of your journal would oblige.



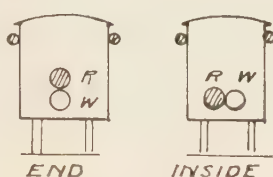
This appliance is a "permanent way slack" signal. They are not used in your district on the Caledonian, but we saw one on the N.B.R. between Edinburgh and Perth. The Caledonian rules say that they must be placed half a mile in advance of the portion of the line over which reduced speed is required, and fixed after due notice has been given to the enginemmen and all concerned. The arm is painted green, and has one white (W) light and one green light (G) side by side as indicated.

A. C. S. (London).—In reply to your enquiry about slip-carriage tail-lights, we may say that on the C.R. the slip-coach regulations require one red and one white light side

**SINGLE**



**TWO SLIPS**



by side on the end of a slip-coach in addition to the usual side-lights. The main train must have the usual tail-lights where there are two carriages to be slipped at different places; the end (or first) slip-coach bears red and white lights one over the other as shown in the diagram. The inside slip-coach, that is, the second carriage to be slipped, must carry the lights required for a single coach, viz., a red and white light side by side. In the

daytime a white disc is substituted for the white light, and an unlighted lamp instead of the red light.

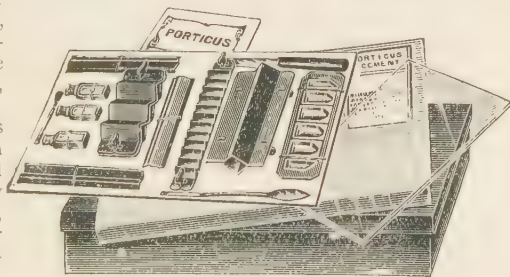
J. TODD (South Shields).—The best way to avoid the usual two bogies and two separate motors fitted to electric locomotive models of the Metropolitan Railway type, is to adopt the method employed in the *Captain* electric locomotive, i.e., to fix the middle pair of driving wheels in the main frames, and mount the outer smaller carrying wheels on swivelling pony trucks. See the *Captain* for November and December, 1909. You can then fit one of Messrs. Thompson & Co.'s 2 B. motors, or any standard "tramcar" type motor such as supplied by Avery, Economic Co., or Bassett-Lowke.

## "PORTICUS"—THE NEW MODELLING MATERIAL.

BOXES of blocks or bricks are familiar objects, but when you are able to mould these bricks in a permanent cement it is a different matter altogether, and from a play-box toy the thing becomes of educational value. To model railway builders the possibilities of "Porticus" are great, and Messrs. J. Bedington & Son, of 45, Northwood Street, Birmingham, are, in addition to their standard set of tools and materials, making up sets suitable for model railway engineers. These sets include designs for modelling tunnel entrances, bridges, culverts, etc.,

The "Porticus" sets include moulds for making stones and bricks, which are afterwards erected in the usual manner and cemented permanently together. Cornices may be moulded, and with the machine round, square or multi-sided columns, etc., may be moulded in various architectural designs.

In such a short review we cannot give a full idea of this new accessory, and therefore readers interested should send to Messrs. Bedington for particulars, or see the material at their local model dealers. Messrs. The Clyde Model Dockyard show some excellent finished specimens at their depot in Glasgow.





## THE LATEST IN MODELS.

### THE CALEDONIAN RAILWAY OFFICIAL MODEL LOCOMOTIVE AND WEST COAST CORRIDOR COACH.



**Just the thing the  
Boy  
WANTS!**

One of the most suitable things than can be proffered. The locomotive is true to scale to the original "Cardean"; it requires no rails or other expensive accessories, and is sufficiently powerful

to pull on any smooth surface the realistic model corridor coach which can be obtained to suit it. As mentioned, the engine is a model of the famous C.R. six-coupled express locomotive "Cardean," and is fitted with a strong clockwork movement and a device which starts the loco when placed on the ground and prevents the wheels racing round in the hand. The wheels are properly coupled, and the colour, lining and lettering are accurate to a degree. The coach is a marvel of realism, as the photograph on another page shows. As to the price, this is the lowest possible, as the models are being offered at practically cost, as an advertising venture.

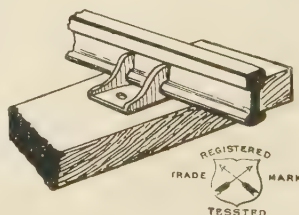
Full particulars as to where the models can be obtained is given in our advertising pages. In case of any difficulty, however, they can be supplied direct from the General Superintendent's Office, 302, Buchanan Street, Glasgow.



### IMPROVEMENTS IN "TESSTED" STEEL RAIL.

MESSRS. BEDINGTON & SON, of Northwood Street, Birmingham, announce improvements in their "Tessted" rustless steel rail, This rail, which we can heartily recommend to all readers, is made of solid drawn steel, and is quite like the real thing. The new chairs are made in pressed sheet metal, and are so shaped as to spring on the rail and not to become

loose. The fishplates are also pressed out of sheet. This permanent way is comparatively cheap, and is supplied by all model dealers, among whom we may name the Clyde Model dockyard, Glasgow; Hull & Son, Birmingham; Bassett-Lowke, Ltd., London and Northampton; and W. F. Bond, 245, Euston Road, London, N.W. Our sketch block gives a good idea as to how this permanent way makes up.



### "KASENIT" THE NEW CASE-HARDENING COMPOUND.

WE have received from Messrs. C. W. Burton Griffiths & Co., the well-known tool merchants of Ludgate Square, London (and of Glasgow and Manchester), a sample of their new case hardening compound "Kasnit" for a practical trial. Kasnit is a powder which will convert the surface of cast or wrought iron, or mild steel, into "dead hard" steel in the shortest possible time, and with uniform results. It can also be used for model work as well as in large engineering. We tried "Kasnit" No. 1, which is specially made for delicate and highly-finished surfaces, and obtained excellent results. The job came out without twist, and quite clean and free from scale. It is not expensive—a  $\frac{1}{2}$  lb. tin costing a 1/- (1/3 post free) will last a model maker a long time. It is sold in  $\frac{1}{2}$  lb. and 1 lb. tins by all ironmongers and tool merchants. In case of difficulty, full particulars will be sent to any reader on application, and, where required, information as to the compounds more suitable for large commercial engineering work.



## NEW MODEL LOCOMOTIVES.

By the time this issue is published, we expect most of our readers will have seen a copy of Messrs. Bassett-Lowke, Ltd.'s railway section of their new catalogue. The general get-up is of the same high class as in previous years, an interesting addition being coloured photographs of two of their leading lines.

In way of new models readers are provided with in clockwork are the M.R. No. 999 class locomotive in gauge No. 0, and the No. 1000 class in gauge No. 1. Both



MESSRS. BASSETT-LOWKE, LTD.'s NEW MODEL CLOCKWORK CALEDONIAN RAILWAY  
No. 140 CLASS LOCO FOR  $1\frac{1}{4}$ " AND  $1\frac{3}{4}$ " GAUGE RAILWAYS.

these are very attractive models indeed, the finish and mechanism being equal in every respect to the excellent L. & S.W.R. model introduced last year.

In steam, the most interesting introduction is the L. & N.W.R. "Black Prince" loco in gauge No. 0, illustration of which we reproduce herewith. This is certainly an advance of anything done commercially in gauge No. 0 locomotives before. In addition to the usual accessories it has lubricator in smokebox and reversing motion in cab. We



THE LATEST DEVELOPMENT IN MODEL STEAM LOCOS—MESSRS. BASSETT-LOWKE'S  
No. 0 GAUGE L.N.W.R. "BLACK PRINCE."

are also informed that in gauge No. 1 the G.W.R. "County of Northampton" locomotive has been improved; this locomotive is now equal to the M.R. and "Black Prince" in equipment and finish. The list also illustrates some attractive complete steam train sets made up of standard locomotives and coaches. These should be very acceptable as Xmas presents. In electric locomotives several new lines are shown, which include model G.N.R. shunting tank, G.E.R. "Claude Hamilton," and C.P.R. 4-6-2 type locomotive. The locomotive accessories pages are also enhanced by several new lines, and locomotive headlights, couplings, etc., are noticeable.

In tin-plate goods wagons about a dozen new patterns are shown, one of the most striking being the N.E.R. 40-ton bogie boiler trolley. This is complete with dummy boiler, and has a very realistic appearance. In the scale model rolling stock in wood, new N.E.R. high-capacity wagons, N.B.R. goods brake, etc., are now being made. Full particulars of the coach parts in gauges Nos. 1, 2, and 3 are also shown, together with numerous sundries for goods rolling stock and coaches stock.

Turning to the section dealing with rails, some very welcome additions to tin-plate track are listed, viz., double crossover, complete double-line junction, points for curves, and parallel points to the new standards. The "Lowko" track is listed in standard circles and has several new accessories. Among the railway sundries new footbridges, railings, stations, lamps, passengers, miniature advertisements, etc., are in evidence. Towards

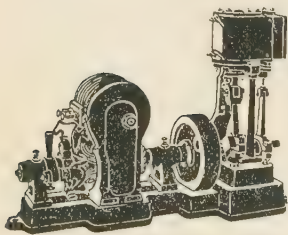


NEW SPRING FISHPLATE FOR SMALL SCALE MODEL PERMANENT WAY, AS DESCRIBED IN SEPTEMBER ISSUE.

the end of the list several new electric motor mechanisms are illustrated by diagrams.

Altogether the list is excellently arranged, and we should certainly advise all those readers who have not seen a copy to send 4d. in stamps to Bassett-Lowke, Ltd., Head Office and Works, Northampton, or get one from over the counter at their London branch, 112, High Holborn, for 3d. The new model Caledonian Railway No. 0 and 1 gauge clock-work engines illustrated herewith are not yet in the list, but full particulars will be sent on application. They will be ready during December.

### MESSRS. STUART TURNER, LTD., HENLEY-ON-THAMES



This firm's new 1910-1911 catalogue is, at the time of writing, in the press, and is a very comprehensive list comprising excellent illustrations, prices and particulars of the famous "Stuart" high-speed engines, boilers, engine fittings, gas engines, small electric power sets with petrol, gas and steam engines as prime mover. The list also contains particulars of the  $3\frac{1}{2}$ " gauge model of the L.N.W.R. tank engine, and the G.N.R.  $3\frac{1}{2}$ " gauge "Atlantic" locomotive which we have described in various numbers in the past.

S. HOLMES & Co., ALBION WORKS, BRADFORD, YORKS, announce a good set of machined parts for a small 3" centre lathe at 12/6 net, or 14/- carriage paid. This lathe should suit model railway builders, as on such a tool they will be able to do satisfactorily a lot of little jobs which will enhance the value of their model rolling stock and other appliances, and would otherwise be impossible.

T. A. WATERS, HORNS, ILFORD.—We have received this firm's list, which comprises model locomotives, engine and boiler fittings, all kinds of materials for model making, including rivets, brass and copper rod, sheet, angles, tees and tubes. We recommend all our readers interested to send 3d. for this list.

CLYDE MODEL DOCKYARD, ARGYLE ARCADE, GLASGOW.—We recommend all our readers to obtain a copy of this well-known firm's catalogue before making their Xmas purchases. It will be sent post free to any reader on receipt of 3d. in stamps.

W. H. HULL & SONS, 4 AND 5, NORTH-WESTERN ARCADE, BIRMINGHAM.—This firm's new list contains many new specialities useful to model railway engineers, and should be consulted before any plans for the future are proceeded with. These new fittings include rails and track material, fences, stations, engine sheds, platforms, name-boards, awnings, etc., in all gauges, as well as all the standard locomotives, wagons and carriages.

G.N.R. 2" SCALE MODEL ON EXHIBITION.—The  $9\frac{1}{2}$ " gauge model of the G.N.R. "Atlantic" engine built to the designs of Mr. Henry Greenly for Mr. J. E. P. Howey will be on show during December in the windows of the builders of the model, Messrs. Bassett-Lowke, Ltd., 112, High Holborn, London, W.C. We recommend our readers not to miss a view of this fine engine.









